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ABSTRACT

This learning activity pac contains information to help the teachers of high school vocational agriculture in the instructional area of agronomy. Each of the two main sections, grain crops and weeds and controls, includes teacher and student units for the section lessons. Teacher units include special instructions--equipment needed (film projector, screen), material needed (seed samples, contact paper), and media needed (filmstrips, texts, pamphlets); learning objectives; pre- and posttests; and answer keys. Student units contain learning objectives, learning activities, and a self-test. Additional learning activities are provided at the end of each student unit. In addition to these elements, the weeds and controls teacher unit includes a bibliography and the student unit contains a "find the word" puzzle. A short description of the pilot program which developed this package is also provided. (CT)

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ED169387

INTRODUCTION TO AGRONOMY

GRAIN CROPS

WEEDS AND CONTROLS

A Learning Activity Pac

in

Agricultural Education Courses

in

Wisconsin

Published by the
Department of Public Instruction
Barbara Thompson, Ph.D., State Superintendent
Division of Instructional Services
Robert Van Raalte, Assistant Superintendent
Bureau for Career and Manpower Development
Ruel F. Falk, Director
Madison, Wisconsin 53702

In Cooperation With
University of Wisconsin-Madison
University of Wisconsin-Platteville
University of Wisconsin-River Falls
Pilot Program Instructors in
Vocational Agriculture in Wisconsin

CE 020 580

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
NATIONAL INSTITUTE OF EDUCATION

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THE LEARNING ACTIVITY PAC

This learning activity pac has been developed to help the teachers of high school vocational agriculture in the instructional area of Agronomy.

In the organization of this resource guide the objectives for the entire unit were initially listed. Each objective (or group of objectives) was then listed separately followed by: (a) the principles and/or concepts to be learned, (b) typical questions and problems of students, (c) suggested learning activities and experiences, and (d) instructional media. When appropriate, a reference number, in parentheses, was given in the instructional media area. This reference number refers to the number of that reference found in the bibliography at the end of this guide.

This guide should be a place from which a high school vocational agriculture teacher can start. It is hoped that each teacher will modify this guide to meet his own local situation. It was never intended that it would include all of the questions, problems, etc. which a teacher would include in this unit. Instead, it was hoped that this unit would give the teacher some typical examples which can be used.

Any constructive criticism of this study guide would be appreciated, and can be sent to any member of the Pilot Program Committee which is listed elsewhere in this guide.

PUBLICATION CREDITS

This learning activity pac was developed in cooperation with the Wisconsin Department of Public Instruction, University of Wisconsin-Platteville, University of Wisconsin-River Falls, University of Wisconsin-Madison, and Pilot Program Instructors in Vocational Agriculture in Wisconsin. This curriculum workshop was conducted at the University of Wisconsin-Madison on July 11-12, 1973 and July 23-27, 1973. The workshop was partially funded under Part C, Vocational Education Act of 1963, as amended in 1968.

This unit was completed by - John Porior, Oshkosh
James Schug, Oshkosh

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The Bureau for Career and Manpower Development staff wishes to express their appreciation to the many persons who assisted the successful completion of the curriculum workshop.

Members of the agriculture education staffs of the University of Wisconsin-Madison, University of Wisconsin-Platteville, and the University of Wisconsin-River Falls, spent many hours in an advisory capacity and in conducting the workshop. Their assistance was invaluable.

Members of the Pilot Program Committee have served so enthusiastically and with such dedication in furthering the cause of vocational agriculture in Wisconsin. Their unselfish and cooperative work in advancing vocational agriculture in Wisconsin will be long appreciated.

Finally, our sincere appreciation to our dedicated pilot program instructors, and WAVAI Curriculum Committee, whose contributions will enrich the lives of thousands of young men and women in this state.

Ruel F. Falk
Director, Bureau for Career
and Manpower Development

Floyd J. Doering
Head Consultant
Agriculture Education

PARTICIPANTS IN CURRICULUM WORKSHOP

Dr. John Thompson - University of Wisconsin-Madison

Dr. Robert Campbell - University of Wisconsin-Platteville

Dr. Harold Matteson - University of Wisconsin-Madison

Dr. Gerald Matteson - University of Wisconsin-River Falls

Dr. Virgil Martinson - Wisconsin Department of Public Instruction

Floyd J. Doering - Wisconsin Department of Public Instruction

Richard Aide - Instructor in Agriculture - Waupun

Albert L. Boardman - " " " - Pittsville

Kenneth Brager - " " " - Gilman

Wilbur C. Foth - " " " - Juneau-Dodgeland

Glen Holman - " " " - Delavan-Darien

Robert Heebink - " " " - New Richmond

Gene Medeke - " " " - Platteville

James Olstad - " " " - Oregon

John Porior - " " " - Oshkosh-West

Robert Ray - " " " - Belmont

George Roberts - " " " - Denmark

James Schug - " " " - Oshkosh-North

William Thompson - " " " - Lake Geneva-Badger

Richard Walton - " " " - Darlington

FOREWORD

In October, 1967, the Wisconsin Department of Public Instruction appointed a pilot program committee composed of personnel representing vocational agriculture, the DPI, and the University of Wisconsin at Madison, Platteville, and River Falls. This committee was charged with the responsibility of drafting guidelines, initiating proposals from high schools, and selecting programs which test a new idea in a realistic setting. Schools were encouraged to be innovative and imaginative in their proposals. The school and program developed at each is included in the list below:

1. Barron High School - Feed Mill Operators Course
2. Waterloo High School - Horticulture Program
3. Janesville High Schools - Agribusiness
4. Plymouth, Cedar Grove, Oostburg - Inter-School Agriculture Program
5. Oshkosh High School - Agribusiness
6. Verona High School - Agriculture Metals Fabrication
7. Jefferson High School - Agribusiness-Independent Study-Co-op Program
8. Rosholt High School - Meat Processing, etc.
9. Cameron High School - Agriculture Sales and Service
10. Bloomer High School - Conservation-Forestry Occupations
11. Green Bay East High School - Agribusiness in a City School
12. Sauk-Prairie High School - Agribusiness Co-op for Disadvantage
13. Southern Door High School - Natural Resources Relating to Tourist and Recreation Industry
14. Whitehall, Arcadia, Taylor, Blair, and Independence High Schools - Inter-School Program in the Meat Industry
15. Antigo High School - Special Agriculture Program in Hydraulics
16. Delavan-Darien High School - Industrialized Learning Program in Agriculture Sales, Supply, and Service. Co-op Education Program
17. Denmark High School - Co-op Program in Agribusiness for Disadvantaged
18. Reedsville High School - Co-op Program in Agribusiness for Disadvantaged
19. Lake Geneva High School - Special Course in Reading for Disadvantaged Students in Agriculture
20. Oregon High School - New Opportunities in a Rural-Urban Community Co-op Program for Disadvantaged Students.
21. Wabeno High School - Forestry-Conservation Co-op Program
22. Waupaca High School - Horticulture Program for Disadvantaged Students
23. Bowler, Wittenberg-Birnamwood, Tigerton High Schools - Forestry Occupations Program
24. Franklin High School - Horticulture Program in a City School
25. Gale-Ettrick High School - Conservation-Summer Program for Disadvantaged Students
26. Middleton High School - Agribusiness Program
27. Pulaski High School - Co-op Program in Agribusiness
28. Seymour High School - Co-op Program in Agribusiness
29. Waupun High School - Canning Industry-Food Processing
30. New Richmond High School - A New Approach to Agriculture Mechanics
31. Oshkosh High Schools - North and West Combining on Agribusiness Program
32. Muscoda High School - Co-op Education Progarm in Production Agriculture

33. Pittsville High School - Co-op Education Program in Production Agriculture
34. Gilman High School - Agriculture Outdoor Recreation (operation of Perkinstown Ski Area)
35. Brillion, Reedsville, Hilbert High Schools - Program for Maintenance Workers

Currently this program has involved 35 separate programs involving 47 high schools. The programs have been evaluated annually and have generally been given high ratings. Only two or three of these programs have resulted in failures, while the vast majority continue to indicate future directions for our program.

Curriculum and Resource Unit Development

The following Resource Units have been developed in special workshops for vocational agriculture instructors during the past two summers:

Agriculture Power-Hydraulics
Preparation for Occupations in Forestry
Preparation for Occupations in Meat Processing
Canning Industry - Commercial Production of Vegetable Crops
Agriculture Sales and Service
Ornamental Horticulture - Landscape and Turf Management
Conservation - Water
Conservation - Air
Learning Activity Pac - The World of Work
Learning Activity Pac - The World of Work - Part II
Outdoor Winter Recreation
The Canning Industry - Vegetable Processing
Basic Herd Health
Agriculture Sales and Service - Machinery Maintenance
Materials Handling - Mechanics
Ornamental Horticulture - Greenhouse Management
Dairy Product Manufacturing - Butter and Cheese
Improved Reading Through Agribusiness Careers
Mechanics Concepts
Hydraulics
Swine Production
Vocational Agribusiness and Natural Resources in Wisconsin Schools

These units have been distributed to all vocational agriculture departments in Wisconsin and have been distributed nationally to all of the states. These units have filled a need and have received high ratings by the instructors. Copies are available at no cost.

INTRODUCTION TO AGRONOMY

GRAIN CROPS

Teacher Section

CROP PRODUCTION

Grain Crops

Part I

Lesson 1 Corn - Uses and Types

Lesson 2 Corn - Culture

Lesson 3 Wheat

Lesson 4 Oats

Lesson 5 Barley

Teacher Section

Grain Crops

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Instructions to the Teacher

I. Instructional Approach

This UNIPAC makes use of a number of resources. The instructor should make these available to the student at the appropriate time. This UNIPAC can be used either as the only method of instruction or in combination with other methods. The pre-test should be given to the student before the unit begins. If the student passes the pre-test, he should be exempt from completing the unit. However, since the pre-test measures only selected learning objectives, the student must take the post-test which will determine his grade. Upon passing the pre-test, the student may (a) take the post-test immediately, (b) review the lessons and take the post-test, (c) complete the lessons and take the post-test no later than completion deadline for the unit.

For the student who completes the unit before its scheduled completion date, alternatives should be provided; the student should select one or more of the following: (a) quest activities (b) assisting other students in this unit, (c) other agricultural study, (d) study in other disciplines, or (e) other suitable activities on released time.

II. Identification of Learners

This UNIPAC can be used for any student enrolled in Agriculture Survey (Agriculture I) courses.

III. Special Instructions

A. Equipment Needed
   1. Filmstrip projector
   2. Screen

B. Material Needed
   1. Seed samples of grains
   2. Visuals for identification
      a. Dried plant samples or
      b. Identification of Agronomy Crops, Interstate Publishers

C. Media Needed
   1. Filmstrips
      a. The Story of a Kernel of Corn, by DeKalb
      b. Hybrid Corn Breeding and Seed Production
   2. Textbooks
      a. Crop Production by Delorit
   3. Pamphlets
      a. U.S.D.A. Handbook AH385A
         Culture and Use of Grain Sorghums

b. UW-Madison Bulletin R1332
Inoculate Legumes--It Pays
c. UW-Madison Bulletin A2413
Winter Wheat in Wisconsin
d. UW-Madison Bulletin R1913
Barley
e. UW-Madison Bulletin A1670
Corn Culture
f. UW-Madison Bulletin R1733
Oats--Culture and Varieties
g. UW-Madison Circular A2215
Southern Corn Leaf Blight in Wisconsin

LEARNING OBJECTIVES

Upon completion of this unit, each student will be able to:

1. List 5 of the 9 leading corn producing states.
2. Name three characteristics which make corn an excellent animal feed.
3. List five different food products made from corn.
4. List 5 of 6 different types or groupings of corn.
5. Be able to match the following terms with their correct explanation: dent corn, soft corn, sweet corn, flint corn, popcorn.
6. Explain in 25 words or less what causes popcorn to pop when heated.
7. Define in writing the following terms: hybrid, viability, double cross hybrid, herbicide, wheel-track planting, plow-planting, broadcast, side-dressing.
8. List the two goals of seedbed preparation.
9. Summarize the importance of wheat as a grain crop.
10. List 4 of the 5 leading states in wheat production.
11. Name 4 products in which wheat is used.
12. List 5 of the 7 market classes of wheat.
13. Describe the type of soil and climatic conditions necessary for wheat production.
14. Compare drilling and broadcasting.
15. Explain the importance of oats as a feed for horses and young cattle.
16. Describe the climate most suitable for the production of oats.
17. Develop two good crop rotations useful in the production of oats.
18. Discuss the effect of high nitrogen fertilizers on oats.

19. Summarize the considerations in combining oats.

20. List 4 important characteristics of malting barley.

21. Define in writing the following terms: uniformity, mellowness, nurse crop.

22. List the three species of barley.

23. List 4 diseases which affect barley.

24. List 3 of the leading barley producing states.

Pre-Test Answer Key

1. Minnesota, Iowa, South Dakota, Missouri, Illinois

5. (1) f (2) c (3) d (4) e (5) b

7. (1) c
(2) a
(3) b
(4) a
(5) d
(6) a
(7) c

11. bread
crackers
spaghetti
alcohol, others

12. (1) hard, red spring wheat
(2) soft, red winter wheat
(3) red, durum wheat
(4) mixed wheat
(5) hard, red winter wheat
durum wheat
white wheat

14. a. less seed is required
b. the seed germinates more rapidly
c. stands are more uniform
less winter injury
yields are almost always higher

15. their bulkiness
high protein content

21. Uniformity can mean same size, quality and absence of foreign or damaged materials.

23. (1) loose smut
(2) covered smut
(3) spot blotch
(4) net blotch
scab

Post-Test Answer Key

1. Five of the following:

Iowa	Minnesota	Missouri
Illinois	Nebraska	Wisconsin
Indiana	Ohio	South Dakota

2. a. low fiber content
   b. high carbohydrates and oil
   c. most palatable of cereal grains

3. a. corn meal
   b. corn flakes
   c. corn starch
   d. corn oil
   e. corn sugar, others

4. a. sweet
   b. pop
   c. dent
   d. flint
   e. soft
      pod

5. (1) f
   (2) c
   (3) d
   (4) e
   (5) b

6. Popcorn explodes due to a large buildup of steam pressure in the kernel as heat is applied.

7. (1) c
   (2) a
   (3) b
   (4) a
   (5) d
   (6) a
   (7) c

8. a. to provide optimum conditions for germination, emergence and seedling growth.
   b. to encourage absorption of water.

9. Wheat is the most important grain crop grown in the world. It is as essential to Americans as rice is to Orientals. Its use is primarily for human consumption.

10. 1. Kansas
2. Nebraska
3. Oklahoma
4. Texas
Colorado

11. bread
crackers
spaghetti
alcohol, others

12. (1) hard, red spring wheat
(2) soft, red winter wheat
(3) red, durum wheat
(4) mixed wheat
(5) hard, red winter wheat
durum wheat
white wheat

13. a. fertile, well-drained silt and clay loam
b. most but not warm, humid regions.

14. a. less seed is required.
b. the seed germinates more rapidly
c. stands are more uniform
less winter injury
yields are almost always higher

15. their bulkiness
high protein content

16. cool, moist climate

17. Various:
C-C-O-W-H
C-O-H-H
C-O-H
P-O-H

18. Too much nitrogen stimulates a tall, rank growth of straw and as a result, lodging often occurs.

19. Oats must be drier than when threshing; it should contain about 13-14% moisture. Oats should be windrowed if weedy or if there is a vigorous growth of seeding, to allow drying.

20. (1) free of disease
(2) mellow
(3) uniform
(4) free from mixture with other grains
pure variety
free of injury, good germination

21. Uniformity can mean same size, quality and absence of foreign or damaged materials.

22. (1) six-row
(2) two-row
(3) irregular

23. (1) loose smut
(2) covered smut
(3) spot blotch
(4) net blotch
scab

24. (1) North Dakota
(2) California
(3) Minnesota
Montana

Name:_____
Section:_____
Date:_____
Score:_____

PRE-TEST

The questions below will measure your knowledge of the subject and are numbered to correspond to the learning objective which the question measures.

1. From the list below, place an X next to the five states which lead in the production of corn.

___Minnesota	___North Dakota
___South Carolina	___South Dakota
___Illinois	___California
___Michigan	___Utah
___Iowa	___Missouri

5. Match the following terms with their correct explanation:

(1)___ dent	a. no commercial importance in U.S.
(2)___ popcorn	b. also known as flour corn
(3)___ sweet	c. pearl and rice are two classes
(4)___ flint	d. corn harvested while immature
(5)___ soft	e. 95% of all corn is this type

7. Select the one best answer to the following:

_____(1) The crossing of two individual corn plants which differ in one or more characteristics produces a seed called a (a) hypocotyl (b) ovule (c) hybrid (d) cross-bred.

_____(2) To apply fertilizer by covering the entire surface is called: (a) broadcasting (b) side-dressing (c) row application (d) wheel-tracking.

_____(3) The crossing of two single hybrids produces a (a) super hybrid (b) double-cross hybrid (c) single-cross hybrid (d) none of the above.

_____(4) A chemical designed to kill only weeds is called (a) herbicide (b) pesticide (c) insecticide (d) none of the above.

_____(5) A method of planting involving the use of a conventional plow followed immediately by planting (2 operations) is (a) conventional (b) drilling (c) broadcasting (d) wheel-track.

_____(6) Plow-planting involves (a) a single operation (b) two operations (c) four operations (d) none of the above.

_____(7) The function of side-dressing is to: (a) kill broadleaf weeds (b) loosen the soil along the rows (c) provide nutrients after growth has begun (d) all of the above.

11. Name 4 products in which wheat is used.

(a)_____
(b)_____
(c)_____
(d)_____

12. List 5 market classes of wheat.

(a)_____
(b)_____
(c)_____
(d)_____
(e)_____

14. What are three advantages of drilling over broadcasting?

(a)_____
(b)_____
(c)_____

15. Why are oats an important feed for horses?

_____
_____

21. Define the following:

uniformity:_____
_____

mellowness:_____
_____

nurse crop:_____
_____

23. List four diseases which affect barley:

(1)_____
(2)_____
(3)_____
(4)_____

Name:_____
Section:_____
Date:_____
Score:_____

POST-TEST

The questions below measure your knowledge of the subject.

1. List 5 of the states which are among the leading corn producers.

a._____
b._____
c._____
d._____
e._____

2. Name 3 characteristics which make corn an excellent animal feed.

a._____
b._____
c._____

3. List 5 different food products made from corn.

a._____ b._____
c._____ d._____
e._____

4. List 5 different types of corn.

a._____
b._____
c._____
d._____
e._____

5. Match the following terms with their correct explanation:

(1)_____dent	a. no commercial importance in U.S.
(2)_____popcorn	b. also known as flour corn
(3)_____sweet	c. pearl and rice are two classes
(4)_____flint	d. corn harvested while immature
(5)_____soft	e. 95% of all corn is of this type

6. Explain in 25 words or less what causes popcorn to pop when heated.

_____
_____

7. Select the <u>one</u> best answer to the following:

_____(1) The crossing of two individual corn plants which differ in one or more characteristics produces a seed called a (a) hypocotyl (b) ovule (c) hybrid (d) cross-bred.

_____(2) To apply fertilizer by covering the entire surface is (a) broadcasting (b) side-dressing (c) row application (d) wheel-tracking.

_____(3) The crossing of two single hybrids produces a (a) super hybrid (b) double-cross hybrid (c) single-cross hybrid (d) none of the above.

_____(4) A chemical designed to kill only weeds is called: (a) herbicide (b) pesticide (c) insecticide (d) none of the above.

_____(5) A method of planting involving the use of a conventional plow followed immediately by planting (2 operations) is (a) conventional (b) drilling (c) broadcasting (d) wheel-track.

_____(6) Plow-planting involves (a) a single operation (b) two operations (c) four operations (d) none of the above.

_____(7) The function of side-dressing is to: (a) kill broadleaf weeds (b) loosen the soil along the rows (c) provide nutrients after growth has begun (d) all of the above.

8. List two goals in preparing a seedbed for corn.

a._____
b._____

9. Why is wheat important as a grain crop?

_____

10. List 4 of the 5 leading states in wheat production.

a._____ b._____
c._____ d._____

11. Name 4 products in which wheat is used.

a._____
b._____
c._____
d._____

12. List 5 market classes of wheat.

a._____
b._____
c._____
d._____
e._____

13. a. Describe the type of soil preferable for wheat.

_____

b. Under what type of climate does wheat grow best?

_____

15. Why is oats an important feed for horses?

_____

16. What climate is more suitable for raising oats?

_____

17. If you were to grow oats, what two rotations might you use?

_____ _____

18. Discuss the effect of too much nitrogen on oats.

_____
_____

19. What must you consider when combining oats?

_____

20. List 4 characteristics necessary for barley to be of malting quality.

(1)_____
(2)_____
(3)_____
(4)_____

21. Define:

uniformity:_____
_____

mellowness:_____
_____

nurse crop:_____
_____

22. The three species of barley are: (1)_____,
(2)_____ and (3)_____.

23. List 4 diseases which affect barley.

(1)_____
(2)_____
(3)_____
(4)_____

24. List 3 of the leading barley producing states.

(1)_____
(2)_____
(3)_____

CROP PRODUCTION

Grain Crops

Part I

Lesson 1 Corn - Uses and Types

Lesson 2 Corn - Culture

Lesson 3 Wheat

Lesson 4 Oats

Lesson 5 Barley

Student Section

LEARNING OBJECTIVES

Upon completion of this unit, each student will be able to:

1. List 5 of the 9 leading corn producing states.
2. Name three characteristics which make corn an excellent animal feed.
3. List five different food products made from corn.
4. List 5 of the 6 different types or groupings of corn.
5. Be able to match the following terms with their correct definitions: dent corn, soft corn, sweet corn, flint corn, popcorn.
6. Explain in 25 words or less what causes popcorn to pop when heated.
7. Define in writing the following terms: hybrid, viability, double-cross hybrid, herbicide, wheel-track planting, plow-planting, broadcast, side-dressing.
8. List the two goals of seed bed preparation.
9. Summarize the importance of wheat as a grain crop.
10. List 4 of the 5 leading states in wheat production.
11. Name four products in which wheat is used.
12. List 5 of the 7 market classes of wheat.
13. Describe the type of soil and climatic conditions necessary for wheat production.
14. Compare drilling and broadcasting.
15. Explain the importance of oats as a feed for horses and young cattle.
16. Describe the climate most suitable for the production of oats.
17. Develop two good crop rotations useful in the production of oats.
18. Discuss the effect of high nitrogen fertilizers on oats.

19. Summarize the considerations in combining oats.

20. List four important characteristics of malting barley.

21. Define in writing the following terms: uniformity, mellowness, nurse crop.

22. List the three species of barley.

23. List four diseases which affect barley.

24. List three of the leading barley producing states.

Lesson 1 -- Uses and Types of Corn

Component: Corn is the king of grain crops.

Learning Objectives:

The student will be able to successfully:

1. List 5 of the 9 leading corn producing states.
2. Name characteristics which make corn an excellent animal feed.
3. List 5 different food products made from corn.
4. List 5 of the 6 different types of groupings of corn.
5. Be able to match the following terms with their correct definitions: dent corn, soft corn, sweet corn, flint corn, pop corn.
6. Explain in 25 words or less what causes popcorn to pop when heated.

Instructions:

Respond to all of the questions in the space allowed. If you have any questions or do not know where to obtain information, ask your instructor.

Learning Activities:

1. Read Crop Production by Delorit pp. 33-38.
2. View the filmstrip: The Story of a Kernel of Corn.
3. Answer the following questions.
   (a) What is meant by the term corn belt?
   (b) What states lead in the production of corn?
   (c) Name as many things as you can think of that corn is used for.
   (d) How much (what percentage) of the corn grown in the U.S. is dent corn?
   (e) What state ranks number one in the production of sweet corn?

(f) Explain or define:

dent corn

flint corn

soft corn

(g) Why is very little pop corn grown in the U.S.?

(h) Why does pop corn pop?

(i) List 3 reasons why corn is an excellent animal feed.

Self-Test:

Review reading assignment and answers to questions.

Lesson 2 -- Culture of Corn

Component: Corn is grown in the field and gardens in each of our fifty states.

Learning Objectives:

The student will be able to:

1. Define in writing the following terms: hybrid, viability, double-cross hybrid, broadcast, side-dressing, wheel-track planting, plow-planting.

2. List the two goals of seed bed preparation.

Instructions:

This unit obviously will be of greatest interest to those individuals raising field and/or sweet corn. Answer all questions neatly in the space provided. All learning activities are required.

Learning Activities:

1. Read Crop Production by Delorit, pp. 38-66.

2. View filmstrip: Hybrid Corn Breeding and Seed Production.

3. Answer the following:

   (a) Define:

   hybrid:

   double-cross:

   (b) What is the difference between broadcast and side-dressing fertilizer?

   (c) What are the good and bad points of wheel-track and plow-planting methods?

   (d) Define:

   herbicide:

   (e) What is meant by seed viability?

Self-Test: Review your notes and study with a friend.

Lesson 3 -- Wheat

Component: Wheat is the most important grain for human consumption.

Learning Objective:

Upon completion of lesson 3, the student will be able to:

1. Summarize the importance of wheat as a grain crop.
2. List 4 of the 5 leading states in wheat production.
3. Name 4 products in which wheat is used.
4. List 5 of the 7 market classes of wheat.
5. Describe the type of soil and climatic conditions necessary for wheat production.
6. Compare drilling and broadcasting.

Instructions:

Respond to the questions in the space available. Learning activities 1, 3, 4, 5, 7, 8, 9 are required. Activities 2 and 6 are optional.

Learning Activities:

1. Read pages 100-129 in Crop Production by Delorit.
2. Using advertisements in your local newspaper, list as many products as you can find which are made from or contain wheat.
3. How does wheat compare with rice and corn as a world food source?
4. What are the five leading states in wheat production?
5. Study the samples of the seven market classes of wheat. List each and one characteristic which will help you identify it. (see next page)

%	Market Class	Identifying Characteristic
____	1. _____	1. _____
____	2. _____	2. _____
____	3. _____	3. _____
____	4. _____	4. _____
____	5. _____	5. _____
____	6. _____	6. _____
____	7. _____	7. _____

6. List the amount of total production of each type of wheat in the U.S. (by percentage). Place your answers on the blanks above.

7. What is the best type of soil for producing wheat?

8. Describe how climate affects the quality of wheat.

9. List the four advantages of drilling over broadcasting.

1. _____
2. _____
3. _____
4. _____

Self-Test:

Study the answers to the above questions and be sure that you can meet all the learning requirements.

1. Why do you think it is important to know something of wheat and how it is grown, although you may never grow wheat?

Lesson 4 -- Oats

Component: Oats rank third as a cereal crop in the United States.

Learning Objectives:

1. Explain the importance of oats as a feed for horses and young cattle.
2. Describe the climate most suitable for the production of oats.
3. Develop two good crop rotations useful in the production of oats.
4. Discuss the effect of high nitrogen fertilizers on oats.
5. Summarize the considerations in combining oats.

Instructions:

All answers to the questions should be written in the space allowed.

Learning Activities:

1. Read pages 130-143 in Crop Production by Delorit.
2. Oats are a superior feed for horses and young cattle because of their _____ and high _____ content.
3. Oats grow best in a _____, _____ climate.
4. Corn-Corn-Oats-Wheat-Clover is one rotation used to grow oats. What are the three other rotations used in the Northern States?

   A._____
   B._____
   C._____

5. What is lodging?

   What causes it?

6. Most oats is harvested by combine.
   What % moisture should oats contain?_____
   What are two reasons for windrowing oats?

   A._____
   B._____

Self-Test: Review questions and reading.

Lesson 5 -- Barley

Component: This cereal grain about equals corn in feeding value.

Learning Objectives: Each student shall be able to:

1. List 4 important characteristics of malting barley.
2. Define in writing the following terms: uniformity, mellowness, nurse crop.
3. List the three species of barley.
4. List 4 diseases which affect barley.
5. List 3 of the leading barley producing states.

Instructions: Respond to all the questions below.

Learning Activities:

1. Read pages 144-161 in Crop Production by Delorit.
2. List the characteristics of malting barley.

   a. _____
   b. _____
   c. _____
   d. _____
   e. _____

3. Define:

   uniformity -

   nurse crop -

   mellowness -

4. List the three species of barley and explain the differences in appearance.

5. List 4 diseases of barley.

6. List the leading barley producing states.

Self-Test: Review answers to questions by studying with a classmate.

1. How important do you think the barley industry is to some large cities?

2. Which city in Wisconsin relies on barley for one of its major industries?

Quest Activities

1. Visit a farm where hybrid seed corn is being produced. Get the farmer to explain how the seed is produced.

2. Visit a feed mill and ask the manager for feed tags from various dairy, swine, and poultry feeds. Examine these tags to see differences in grain ingredients.

3. Examine various pet foods for cereal grain contents, and report your findings to the class.

4. Visit a supermarket and compile a list of (a) products which contain grain products (b) animal products to which grains probably have been fed. List as many as possible.

CROP PRODUCTION

Grain Crops

Part II

Lesson 6 Rye

Lesson 7 Sorghums

Lesson 8 Flax

Lesson 9 Buckwheat

Lesson 10 Soybeans

Teacher Section

Instructions to the Teacher

I. Instructional Approach

This UNIPAC makes use of a number of resources. The instructor should make these available to the student at the appropriate time. This UNIPAC can be used either as the only method of instruction or in combination with other methods. The pre-test should be given to the student before the unit begins. If the student passes the pre-test, the student should be exempt from completing the unit. However, since the pre-test measures only selected learning objectives, the student must take the post-test which will determine his grade. Upon passing the pre-test, the student may (a) take the post-test immediately, (b) review the lessons and take the post-test, (c) complete the lessons and take the post-test no later than completion deadline for the unit.

Alternatives should be provided; the student should select one or more of the following: (a) quest activities (b) other agricultural study (c) study in other disciplines (d) assisting other students in this unit or (e) other suitable activities on released time.

II. Identification of Learners

This UNIPAC can be used for any student enrolled in Agriculture Survey (Agriculture I) courses.

III. Special Instructions

A. Equipment needed

(None required for the exercises listed)

B. Materials needed

(None required for the exercises listed)

C. Media Needed

1. Textbooks

a. Crop Production by Delorit

2. Pamphlets

a. USDA Handbook AH385A
"Culture and Use of Grain Sorghums"
b. UW-Madison Bulletin R1332
"Inoculate Legumes--It Pays"

LEARNING OBJECTIVES

Upon completion of this unit, each student will be able to:

1. List four uses of rye.
2. Compare the acreage of rye grown to the other grains.
3. Discuss the time of year in which rye should be sown.
4. List two reasons why rye is seldom grown on fertile, well-drained soil.
5. Recall three reasons for sorghum's adaptation to areas of low rainfall.
6. List four types of sorghums.
7. List five uses of sorghums.
8. Explain what prussic acid poisoning is, its cause, and precautions which can be taken to decrease the chance of poisoning.
9. List the three states which produce more than 90% of the flax grown in the United States.
10. List two important products produced from flax seed.
11. Explain and compare two of the three methods of extracting the linseed oil from the flax seed.
12. Describe the characteristics of a well-prepared seedbed.
13. Define in writing dockage.
14. List three important products in which linseed oil is used.
15. List 3 of the 4 top states in buckwheat production.
16. Name four uses of buckwheat.
17. List the three types of buckwheat.
18. Name three important uses of soybeans for (a) industrial purposes, (b) human food, and (c) animal feed.
19. List four of the states which lead in the production of soybeans.

20. Describe characteristics of soil and climatic requirements of soybeans.

21. Explain the reason for the large number of varieties which are grown.

22. Explain a situation in which it might be better to plant soybeans than corn.

23. List four advantages of planting soybeans in rows.

24. List three diseases of soybeans.

25. List four factors which affect the rate at which soybeans are planted.

Pre-Test Answer Key

1. a. flour
   b. alcohol
   c. packing material
   d. cover crop
   others

2. (1) Corn
   (2) Wheat
   (3) Oats
   (4) Barley
   (5) Rye

6. a. Sorgos or sweet sorghums
   b. Grain sorghums
   c. Grass sorghums
   d. Broom sorghums

10. linseed oil
    linseed meal

16. a. feed
    b. flour
    c. cover
    d. groats

18.

Industrial	Human	Animal
Soap	Flour	Hay
Plastics	Margarine	Soybean meal
Paints	Soy sauces	Pasture
others		

23. a. Higher yields
    b. Better quality seed
    c. Greater uniformity of stand
    d. Reduced lodging
    lower seed requirement
    better weed control

Post-Test Answer Key

1. a. flour b. alcohol c. packing material d. cover crop others

2. Corn-wheat-oats-barley-rye

3. April, May, August, September

4. a. heavy, rank growth results in lodging
   b. other grains are more productive on fertile land

5. a. leaves and stems are covered by a waxy material that reduces water losses.
   b. loss of water from transpiration are reduced because of small leaf area.
   c. plants are able to remain dormant during dry, hot weather.

6. a. Sorgos or sweet sorghums
   b. Grain sorghums
   c. Grass sorghums
   d. Broom sorghums

7. a. livestock feed (grain, hay, fodder)
   b. dehydrated sorghums
   c. sirup
   d. manufacture of wax, starch, etc.
   e. sorghums flour

8. a. poisoning results when cattle graze young, actively growing leaves of sorghums.
   b. precautions (one or more of the following)
      -delayed grazing
      -limited planting on fertile soils
      -filling cattle prior to grazing
      -test for prussic acids

9. North Dakota
   South Dakota
   Minnesota

10. Linseed oil
    linseed meal

11. a. consists of crushing the flaxseed into flakes, cooking them with steam, and then extracting the oil using hydraulic presses.
    b. seed is cracked, dried, and passed through a steam-jacketed container which heats the mass. The oil is removed as the mass moves through an expeller machanism.
    c. involves cracking seed, heating lightly, and then rolling seeds. A volatile solvent is then used to extract the oil from the rolled sheet of seed.

12. firm, well-worked, free of weeds, clods, trash; moist

13. dockage includes weed seeds, cracked and immature seed, other crop seeds, chaff, and broken stems.

14. paint, varnish, soap, linoleum, oil cloth, etc.

15. New York, Pennsylvania, Michigan, Wisconsin

16. feed, flour, cover crop, groats

17. common
tartary
notched or winged

18.

Industrial	Human	Animal
soap	flour	hay
plastics	margarine	soybean meal
paints	soy sauces	pasture
others		

19. Illinois, Iowa, Indiana, Ohio, Missouri, Minnesota.

20. a. fertile soils with high organic matter.
b. warm climate with a growing season similar to corn.

21. Soybeans are grown throughout the U.S. They do not adapt well to changes in soil and climate; flowering time is affected by photoperiodism.

22. Late spring
rainy weather
after harvesting peas

23. a. Higher yields
b. Better quality seed
c. Greater uniformity of stand
d. Reduced lodging
lower seed requirements
better weed control

24. a. bacterial blight
b. soybean mosaic
c. downy mildew
frogeye leafspot
brown stem canker
stem canker

25. a. size of seed
b. purpose for which they are grown
c. method of planting
d. percentage of germinating seed
soil moisture
fertility of soil
row spacing

Name_____
Section_____
Date_____
Score_____

PRE-TEST

The following questions are designed to test the knowledge of the student. They are numbered to correspond to the learning objective which they measure.

1. Name four uses of rye.

a._____ b._____
c._____ d._____

2. Rank the following crops: Corn, Barley, Rye, Oats, Wheat in order beginning with the one with the largest acreage grown.

(1)_____
(2)_____
(3)_____
(4)_____
(5)_____

6. Name four types of sorghums

a._____ b._____
c._____ d._____

10. Name two important products produced from flax seed.

a._____ b._____

16. Name four uses of buckwheat.

a._____ b._____
c._____ d._____

18. List three uses of soybeans for each:

Industrial Uses	Human Uses	Animal Uses
1._____	1._____	1._____
2._____	2._____	2._____
3._____	3._____	3._____

23. Four advantages of planting soybeans in rows are:

a._____
b._____
c._____
d._____

Name_____
Section_____
Date_____
Score_____

POST-TEST

1. Name four uses of rye.

_____ _____

_____ _____

2. Rank the following crops: Corn, Barley, Rye, Oats, Wheat, in order beginning with the one in largest acreage grown.

1._____
2._____
3._____
4._____
5._____

3. Circle the four best months of the year in which rye should be sown in Wisconsin.

Jan	Feb	Mar	Apr	Jun	May
Jul	Aug	Sep	Oct	Dec	Nov

4. Why is rye seldom grown on well-drained, fertile soils?

a._____
b._____

5. List three reasons why sorghums are adapted to areas of low rainfall.

a._____
b._____
c._____

6. Name four types of sorghums.

a._____ b._____
c._____ d._____

7. List five uses of sorghums.

8. a. What causes prussic acid poisoning?

b. How can it be prevented?

9. List the three states which lead in the production of flax.

a._____ b._____ c._____

10. Name two important products produced from flax seed.

a._____ b._____

11. Explain and/or define two of the three following methods of extracting linseed oil.

a. Hydraulic method:_____
_____
_____

b. Expeller method:_____
_____
_____

c. Solvent process:_____
_____
_____

12. Describe the characteristics of a well-prepared seedbed.

_____

13. Define dockage:_____
_____

14. List three products in which linseed oil is used.

15. List three of the top states in buckwheat production.

_____,_____,_____

16. Name four uses of buckwheat.

a._____ b._____
c._____ d._____

17. List three types of buckwheat.

a._____ b._____ c._____

18. List three uses of soybeans for each:

Industrial Uses	Human Uses	Animal Uses
1._____	1._____	1._____
2._____	2._____	2._____
3._____	3._____	3._____

19. List four of the leading soybean states.

a._____ b._____
c._____ d._____

20. a. On what type of soil will soybeans grow best?

b. What is the preferrable type of climate for soybeans?

21. Why are many different varieties of soybean grown?

22. Explain a situation in which it might be better to plant soybeans than corn.

23. Four advantages of planting soybeans in a row are:

a._____
b._____
c._____
d._____

24. Name three diseases of soybeans.

a._____
b._____
c._____

25. List four factors which affect the rate at which soybeans are planted.

a._____
b._____
c._____
d._____

CROP PRODUCTION

Grain Crops

Part II

Lesson 6 Rye

Lesson 7 Sorghums

Lesson 8 Flax

Lesson 9 Buckwheat

Lesson 10 Soybeans

Student Section

LEARNING OBJECTIVES

Upon completion of this unit, each student will be able to:

1. List four uses of rye.
2. Compare the acreage of rye grown to the other grains.
3. Discuss the time of year in which rye should be sown.
4. List two reasons why rye is seldom grown on fertile, well-drained soil.
5. Recall three reasons for sorghum's adaptation to areas of low rainfall.
6. List four types of sorghums.
7. List five uses of sorghums.
8. Explain what prussic acid poisoning is, its cause, and precautions which can be taken to decrease the chance of poisoning.
9. List the three states which produce more than 90% of the flax grown in the U.S.
10. List two important products produced from flax seed.
11. Explain and compare two of the three methods of extracting the linseed oil from the flax seed.
12. Describe the characteristics of a well-prepared seedbed.
13. Define in writing dockage.
14. List three important products in which linseed oil is used.
15. List three of the four top states in buckwheat production.
16. Name four uses of buckwheat.
17. List the three types of buckwheat.
18. Name three important uses of soybeans for each of (a) industrial purposes (b) human food and (c) animal feed.
19. List four of the states which lead in the production of soybeans.
20. Describe characteristics of soil and climatic requirements of soybeans.

21. Explain the reason for the large number of varieties which are grown.

22. Explain a situation in which it might be better to plant soybeans than corn.

23. List four advantages of planting soybeans in rows.

24. List three diseases of soybeans.

25. List four factors which affect the rate at which soybeans are planted.

Lesson 6 -- Rye

Component: Rye is used not only as a grain crop but is important for its forage as well.

Learning Objective: Upon completion of lesson 6, each student shall be able to:

1. List four uses of rye.
2. Compare the acreage of rye grown to the other grains discussed.
3. Discuss the time of year in which rye should be sown.
4. List two reasons why rye is seldom grown on fertile, well-drained soil.

Instructions: Respond to all questions in the space below.

Learning Activities:

1. Read pages 163-170 in Crop Production by Delorit.

2. List the different uses of rye.

-	-
-	-
-	-

3. How many acres of the following crops are grown annually?

Corn_____ Wheat _____
Oats_____ Barley_____
Rye_____

4. When should rye be sown?

5. Two reasons why rye is not grown on well-drained, fertile soils are:

a._____
b._____

Self-Test: Review questions and reading.

Lesson 7 -- Sorghums

Component: Sorghums are often called the "camel" of cultivated crops.

Learning Objectives: The student shall be able to:

1. Recall three reasons for sorghum's adaptation to areas of low rainfall.
2. List four types of sorghums.
3. List five uses of sorghums.
4. Explain what prussic acid poisoning is, its cause, and precautions which can be taken to decrease the chance of poisoning.

Instructions: Respond to questions 1, 2, 3, 5 and 7 in the space below. Answer either 4 or 6. Number 10 is optional.

Learning Activities:

1. Read pages 171-186 in Crop Production by Delorit.
2. Why are sorghums called the "camel" of cultivated crops?
3. List three reasons for sorghum's adaptation to areas of low rainfall.

   a. _____
   b. _____
   c. _____

4. Where are sorghums most extensively grown?
5. What are the four types of sorghums grown?

   - -
   - -

6. Describe the principal characteristics of grain sorghums.
7. What is prussic acid poisoning?
8. What causes it?
9. What can be done to reduce the chance of it occurring?
10. Review U.S.D.A. Handbook No. AH385A Culture and Use of Sorghums.

Self-Test: Review the reading and your answers to the questions.

1. Why are very few sorghums grown in Wisconsin?

Lesson 8 -- Flax

Component: Flax is grown primarily for its seed.

Learning Objective: Upon completion of lesson 8 the student shall be able to:

1. List the three states which produce more than 90% of the flax grown in the U.S.
2. List two important products produced from flax seed.
3. Explain and compare two of the three methods of extracting the linseed oil from the flax seed.
4. Describe the characteristics of a well-prepared seedbed.
5. Define in writing dockage.
6. List three important products in which linseed oil is used.

Instructions: Respond to all the learning activities below.

Learning Activities:

1. Read pages 202-212 in Crop Production by Delorit.

2. The three states in which most of the flax is grown are _____, _____, and _____.

3. A small amount of flax is produced for its fiber. Two important uses of flax seed are (a)_____ and (b)_____.

4. Linseed oil can be extracted by three methods: Explain each.

   a. hydraulic method:

   b. expeller process:

   c. solvent process:

5. Linseed oil is used in the manufacture of _____, _____, _____, _____, and _____.

6. Preparation of the seedbed is important to insure good germination results. This is the case whether you are planting flowers in a garden or a field crop. In many cases the characteristics of a desirable seedbed are quite similar. What are the characteristics of a desirable seedbed for flax production?

7. Write a definition for dockage:

8. Why is it important that the farmer remove as much foreign matter as possible from the flax straw before shipping it to the market?

Self-Test: Review your answers to the above questions.

Lesson 9 — Buckwheat

Component: Buckwheat is only of minor importance in American agriculture.

Learning Objectives: Upon completion of lesson 9, the student shall be able to:

1. List three of four top states in buckwheat production.
2. Explain why high quality buckwheat flour is dark in color.
3. Explain four uses of buckwheat.
4. List the three types of buckwheat.

Instructions: Respond to the questions in the space allowed.

Learning Activities:

1. Read pages 214-221 in Crop Production by Delorit.
2. How important is buckwheat to American agriculture?
3. What are the leading states in the production of buckwheat?
4. What uses are made of buckwheat as a livestock feed?
5. List some other uses of buckwheat.
6. Most of the buckwheat grown in the U.S. is of the _____ type. The two other types of buckwheat are _____ and _____.
7. What causes the dark color of high quality buckwheat flour used in making pancakes?

Self-Test: Review your answers.

Lesson 10 -- Soybeans

Component: The soybean grain has high nutritional value for animals and humans alike.

Learning Objectives: Upon completion of this lesson, the student shall be able to:

1. Name three important uses of soybeans for (a) industrial (b) human food and (c) animal feed.
2. List four of the states which lead in the production of soybeans.
3. Describe characteristics of soil and climatic requirements of soybeans.
4. Explain the reason for the large number of varieties which are grown.
5. Explain a situation in which it might be better to plant soybeans than corn.
6. List four advantages of planting soybeans in rows.
7. List three diseases of soybeans.
8. List four factors which affect the rate at which soybeans are planted.

Instructions: Respond to all questions in the space allowed.

Learning Activities:

1. Read pages 386-405 in Crop Production by Delorit.
2. What has been the trend in soybean production in the past ten years?
3. Name some of the states which are among the top producers of soybeans.
4. What are two things which should be considered when selecting a variety of soybeans?

5. Why are there many different varieties grown in the U.S.?

6. Describe the soil and climate that soybeans prefer.

7. When should soybeans be planted?

8. What are the disadvantages of planting too early?

   Of delayed planting?

9. What are the advantages of planting soybeans in rows?

10. List the diseases which may affect soybeans.

11. What factors affect the rate of planting?

12. What methods are used in harvesting soybeans for seed?

Self-Test: Review your answers to the questions.

Quest Activities

1. Visit your local seed dealer and ask him about the varieties of seed he sells. Report to the class.

2. Visit a store which sells paint and varnish or examine cans you have at home to see if they contain a product of the flax seed. If so, how much, etc.? Report your observations.

3. Research Inoculation of Legumes. Learn how inoculation works, the benefits of it and how it is accomplished.

   Inoculating Legumes -- It Pays UW-Madison Bulletin R1332

4. Using the grain seed samples available, examine different characteristics of each seed and see how many you can learn to identify.

INTRODUCTION TO AGRONOMY

WEEDS AND CONTROLS

Teacher Section

Weeds and Controls

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Instructions To The Teacher

I. Instruction Approach

This UNIPAC involves considerable use of movies, slides, filmstrips and textbooks. The instructor should make these available to the student at the appropriate time. This UNIPAC can be used either as the only method of instruction or in combination with other methods of instruction. The pre-test should be given to the student before the unit begins. If the student passes an objective in the pre-test, he does not have to do the learning activities for this objective. The instructor may want to correct the pre-test or he may wish to have the student correct his own. In many exercises the answers are in (parenthesis).

II. Identification of Learners

This UNIPAC can be used for any 9-12 grade Agriculture I class.

III. Special Instructions

A. Equipment needed:

1. Tape recorder
2. Slide projector
3. Film strip projector

B. Materials needed:

1. Cardboard
2. Contact paper
3. Weed press

C. Media needed:

1. Slides and tape
   a. Weed control (9)
   b. Tape - Certified Seed
2. Text Books
   a. Weeds of North Central States (3)
3. Pamphlets
   a. Pest control in forage and small grains (5)
   b. Pest control in corn and soybeans (6)

Pre-test Answer Key

I.

1. True
2. False
3. True
4. False
5. False
6. True
7. True
8. True
9. False
10. True
11. False
12. True

13.

A.	Seed	Dandelion
B.	Bulbs	Yellow Nutgrass
C.	Rhizome	Quack grass

14.

A. Preplant
B. Pre-emergence
C. Post-emergence
D. Contact Application

II.

1.

A.	Red Root Pig Weed	Annual
B.	Lambs Quarter	Annual
C.	Fall Panilum	Annual
D.	Wild Mustard	Winter Annual
E.	Common Ragweed	Annual
F.	Barnyard Grass	Annual

III.

A. Tillage----------Working of the Soil
B. Certified Seed---------Seed which germination and weed freeness have been tested.
C. Five Reasons to Cultivate
   1. Break the soil crust formed by rainfall
   2. Improve soil texture
   3. Increases water infiltration by 50%
   4. Reduces evaporation
   5. Increases aeration in soil
   6. Kills weeds

D.
   1. Rough Pigweed
   2. Green Foxtail

E.

Control with corn and soybeans, because wild mustard grows most in the fall and early spring, when cultural practices are being used to prepare a seed bed.

F.

Yes -- yields can be increased by 5-10%

IV.

A. Two advantages of the Piston Pump
1. Wear resistant
2. Handles suspension well
3. Positive displacement
4. High pressure capability
5. Good priming characteristics

B.
1. Low pressure
2. Priming capacity none
3. Easy to vapor lock
4. Must run at high speed
5. Not positive displacement

C.

1. He will spray 10 acres

$\frac{A}{B} = C \quad \frac{.2}{.80} = 2.5$ per acre $2.5 \times 10 = 25$ pounds of Aatrex

V.

A.

1. In soybeans use Lorax at 3-4 pounds per acre of other Herbicide recommended by the University Extension.

   Quackgrass cannot be controlled, must be killed the year preceding soybeans.

2. Apply 1 - 1 1/2 qts. per acre of Lasso plus 1 1/4 - 2 pounds of Aatrex 80 w.

3. 2 pounds of Aatrex per acre before planting and 2 pounds of Aatrex per acre after planting.

B.
1. Weather conditions
2. Type of weeds

Post-test Answer Key:

I.

A. Multiple Choice

1. A	11. B	21. A
2. A	12. B	22. A
3. B	13. A	23. A
4. B	14. C	24. A
5. C	15. D	25. C
6. B	16. A	26. A
7. A	17. C	27. C
8. D	18. B	28. A
9. B	19. D	29. C
10. A	20. C	30. B

B.

1. Wind
2. Animal
3. Water
4. Man

C.

1. Herbicide
2. Crop completion
3. Cultivation
4. Mowing
5. Prevent seed formation
6. Rotation of crops

D.

1. Annual----------Barnyard Grass
2. Biennial----------Wild Carrot
3. Perennial----------Quack Grass

E.

1. Wild Mustard
2. Ragweed
3. Yellow Rocket
4. Barnyard Grass
5. Quack Grass
6. Crab Grass

III.

A.

1. Crop Planting
2. Herbicides
3. Cultivating

B.

1. Tillage----------Working of the soil
2. Primary Tillage------Plowing, disking and cultivating which kills the weeds.
3. Secondary Tillage----Shallow cultivation
4. Preparation----------
5. Spring Tillage-------Tillage in the springtime and helps kill perennials
6. Certified seed-------Seed tested for germination percentage and how many and what kind of weeds are in the seed.

C.

1. Break the soil crust formed by rainfall
2. Improve soil texture
3. Increases water infiltration by 50%
4. Reduces evaporation
5. Increases aeration in soil
6. Kills weeds

IV.

A.

1. By-pass line
2. Agitator line
3. Suction line
4. Pump
5. Spray tank
6. Pressure Gauge
7. Pressure regulator
8. Shut-off valve
9. In-line strainer
10. Boom

B.

1. Measure of 102 feet
2. Check tractor spread, which pulls sprayer at working speed
3. When sprayer is standing still collect measured samples from different nozzles the time it took to drive the 102 feet. Use chart to calibrate gallons per acre.

D.

1. $\frac{A}{B} = C$

$\frac{A}{10} = 4$

$A = 10 \times 4$

$A = 4$ lbs. for 1 acre

2.

A. $\frac{2}{.80} = 2.5$ pounds of Aatrex per acre

B. $\frac{300}{20} = 15$ acres

C. 15 acres x 2.5 = 37 pounds of Aatrex

V.

A.

1. Aatrex — 2 lbs. per acre
   Aatrex -- Lasso — 2 qts. of Lasso per acre
   2 lbs. of Aatrex per acre

2. Aatrex or any Aatrex combination
3. Amiben 1 to 1-1/2 gallons per acre Pre-emergence
   Lorax 3 to 4 pounds per acre " "
   Treflan 1/2 to 1 qt. per acre " "
   Lasso 2 to 2-1/2 qts. per acre " "
4. There is no real control, must be done preceding year.
5.
   a. Always use minimum rates to kill the weeds
   b. Treated fields should always be plowed before planting a sensitive crop
   c. Earlier treatment best, gives more time for breakdown
   d. Select crop with high degree of tolerance to the previous year's herbicide
6. Preplantand pre-emergence treatment provide consistency. Better weed control than post emergence spray.
7. Yes, because research has shown that corn production can be increased by 5 - 10 % on crusty soil for the following reasons:
   a. breaks the surface crust formed by rainfall
   b. improves soil texture
   c. increases water infiltration up to 50%
   d. reduces evaporation of water
   e. increases aeration in the soil for plant roots
   f. stimulates root growth

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PRE-TEST FOR WEEDS AND THEIR CONTROLS

Directions:
Try the exercise below to check your knowledge of weeds.

If you pass the test or certain sections you will not have to do the exercises for that section.

I. True-False: Write the correct response to the left of the question in the space provided.

_____ 1. Absorption means the process by which herbicides are taken into the plants.

_____ 2. Annual means a plant that takes two years to complete its life cycle.

_____ 3. The chemical in a product that is responsible for the killing effect on the plant is called residue.

_____ 4. A herbicide that kills primarily by traveling into the plant tissue is called a contact herbicide.

_____ 5. A herbicide is a chemical used to kill insects that damage crops or gardens.

_____ 6. A thinner is the same as a diluent.

_____ 7. Emergence is the appearance of the first part of the plant through the ground.

_____ 8. Illegal residue is a chemical that is not in violation of government standards for safe use.

_____ 9. Noxious weeks are those designed by the government that are in danger of dying out.

_____ 10. Post-emergent chemical treatment of a field is done before the crop is out of the ground.

_____ 11. The amount of pesticide in or on a product when it is marketed is called residue.

_____ 12. A corn plant in a soybean field is considered a weed.

_____ 13. List 3 ways in which weeds are propagated and give an example of each.

A.

B.

C.

14. List 4 types of herbicide application.

A. B.

C. D.

II. Identify the below weeds by their proper name and life cycle.

A. _____

_____

B. _____

_____

C. _____

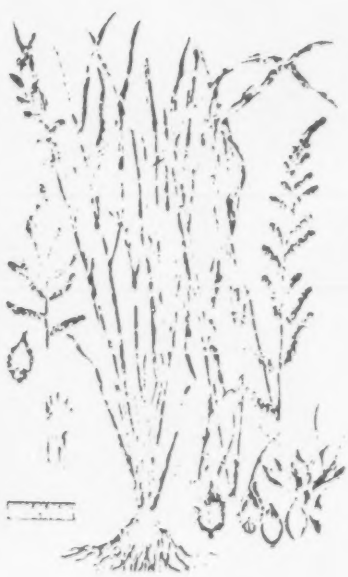
_____

D. _____

_____

E. _____

_____



F. _____

_____

G. Identify the pictures or samples of weeds being displayed in front of the class. Identify each sample and give its life cycle.

1. (name) _____
   (life cycle) _____
2. _____
   _____
3. _____
   _____
4. _____
   _____
5. _____
   _____
6. _____
   _____
7. _____
   _____
8. _____
   _____
9. _____
   _____
10. _____
    _____
11. _____
    _____
12. _____
    _____

III. Define:

A. Tillage

B. Certified seed

C. List 5 reasons for cultivation.

D. Name 2 weeds that cannot live in the shade.

1. 2.

E. How would you control a field of wild mustard without spraying, but by using specific cropping methods?

F. Does it pay to cultivate corn and soybeans in crusty soil after it has been sprayed with an effective herbicide?

IV.

A. List 2 advantages of the piston pump.

1.

2.

B. List 2 disadvantages of the centrifugal pump.

1.

2.

C. Aatrex is 80% active ingredient. Mr. Jones wants to apply 2 pounds per acre of actual material. How many pounds should he put in a 200 gallon sprayer which sprays 20 gallons per acre? (show all math)

V.

A. List one herbicide that can be used for the following weed situation and the rate of application.

1. Control mixed stands of annual broadleaf and quack grass.

2. Control primarily annual grasses in corn.

3. Control quackgrass in corn.

B. List two factors which are used to determine if a herbicide is banded or broadcasted.

1.

2.

POST TEST

I. The below questions will be to test for lesson 1.

A. DIRECTIONS: The below questions are multiple choice

____ 1. The process by which herbicides are taken into plants by roots or foliage (stomate, cuticle, etc.).
a. absorption
b. carrier
c. adsorption
d. surfactant

____ 2. A plant that completes its life cycle in one year and then dies.
a. annual
b. biennial
c. perennial
d. simple perennial

____ 3. The chemicals in a product that are responsible for the herbicidal or killing effects on plants.
a. basal treatment
b. active ingredient
c. bush control
d. residue

____ 4. A plant that completes its life cycle in two year then dies.
a. annual
b. biennial
c. perennial
d. simple perennial

____ 5. An application to a continuous restricted band such as in/or along a crop row, rather than cover the entire field.
a. broadcast
b. carrier
c. band
d. post-emergence

____ 6. The liquid or solid material added to a chemical compound to facilitate its storage, shipment or use in the field.
a. surfactant
b. carrier
c. wetting agent
d. diluent

____ 7. An undiluted chemical.
a. concentrate
b. emulsion
c. concentration
d. formulation

____ 8. A herbicide that kills primarily by contact with plant tissue rather than as a result of translocation.
a. pesticide
b. LD 50
c. wetting agent
d. contact

____ 9. A chemical used for killing plants or stunting their growth. One type of pesticide.
a. insecticide
b. herbicide
c. pesticide
d. phytotoxic

____ 10. A compound which causes the leaves or foliage to drop from the plant.
a. defoliant
b. simple perennial
c. emergence
d. weed

___ 11. A weed defined by law especially undesirable, troublesome and difficult to control.
a. Rhizome
b. noxious
b. stolon
d. residue

___ 12. A legal identification attached to containers of any commercially sold agricultural chemical giving a summary of its properties and uses.
a. phloem
b. label
c. weed
d. residue

___ 13. Lethal dose 50% (the amount of a pesticide that will kill 50% of the test animals). It may be oral (in the mouth) or dermal (on the skin).
a. LD 50
b. LD 30
c. DL 50
d. DL 30

___ 14. A plant that continues to live from year to year, in many cases, in cold climates, the stem dies down but the root persists.
a. annual
b. biennial
c. perennial
d. pesticide

___ 15. A general term which includes chemical to control insects, weeds, plant diseases, and rodents.
a. insecticides
b. redenticides
c. fungicides
d. pesticides

___ 16. Chemical treatment of a crop after the plant has come out of the ground.
a. post-emergence
b. pre-planting treatment
c. pre-emergent treatment
d. residue

___ 17. Chemical treatment of the crop before the plant has come out of the ground.
a. post-emergence
b. pre-planting treatment
c. pre-emergent treatment
d. residue

___ 18. Chemical treatment of the crop before the crop is planted.
a. post-emergence
b. pre-planting treatment
c. pre-emergent treatment
d. residue

___ 19. The amount of pesticide in or on a product when it is marketed.
a. post-emergence
c. pre-planting treatment
c. pre-emergent treatment
d. residue

___ 20. Annual plants that germinate in the spring, produce seed and mature and die by the fall such as smartweed, ragweed.
a. winter annual
b. biennial
c. summer annual
d. summer perennial

___ 21. An annual plant that remains dormant in the summer then germinates in the fall and winter and usually produces seed in the spring such as wild mustard.
a. winter annual
b. biennial
c. summer annual
d. summer perennial

____ 22. Any material capable of dissolving another material.
a. solvent
b. stool
c. stolon
d. suspension

____ 23. The movement of airborne spray particles from the spray nozzle beyond the intended contact area.
a. spray drift
b. toxixity
c. translocated herbicide
d. synergism

____ 24. A material added to a herbicide to increase the effectiveness of the herbicide in spreading and wetting waxlike plant surfaces.
a. wetting agent
b. solvent
c. synergism
d. translocation

____ 25. The process of limiting weed infestations so that crops can be grown profitably or other operations can be conducted efficiently.
a. weed
b. slurry
c. weed control
d. spray drift

____ 26. An unwanted plant which interferes with the growth or production of more economically valuable plants.
a. weed
b. annual
c. weed control
d. biennial

____ 27. A statement on the label limiting the liability of the chemical company.
a. label
b. statement
c. warranty clause
d. none of the above

____ 28. This perennial spreads normally by seed, injured roots will produce two plants. Example dandelion, curly dock.
a. simple perennials
b. creeping perennials
c. bulbous perennials

____ 29. Perennials that reproduce by seed and bulblets. Examples are wild garlic and wild onion.
a. simple perennials
b. creeping perennials
c. bulbous

B. List the four agents that spread weeds and give an example of each.
1.
2.
3.
4.

C. List six methods of controlling weeds and provide an example of each.
1.
2.
3.
4.
5.
6.

D. List the four groups of plants based on their life cycle and give an example of each.

1.
2.
3.
4.

E. List six noxious weeds for Wisconsin.

1.
2.
3.
4.
5.
6.

II. Lesson number two will be an identifying test to test your knowledge of identifying different weeds.

III. The below section will measure your knowledge of lesson number 3.

A. List three methods of controlling weeds.
1.
2.
3.

B. Write the meaning for the following terms and how they relate to weed control.
1. Tillage

2. Primary tillage

3. Secondary tillage

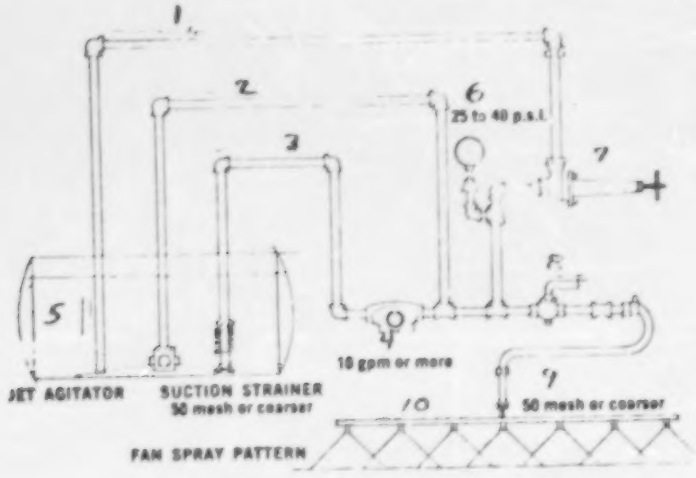
4. Spring tillage

5. Certified seed

C. List five reasons for a person to cultivate his corn, soybeans or garden.
1.
2.
3.
4.
5.

IV. The below section will test for lesson number 4.

A. Identify the parts of this sprayer on the picture below.



1. 6.
2. 7.
3. 8.
4. 9.
5. 10.

B. Explain in detail how to calibrate a sprayer.

C. Draw the fan pattern of a spray nozzle that you would use to broadcast spray, and identify it.

D. Solve the following problems and show all math, neatness is part of the grade.

1. Suppose you are going to use the herbicide, Eptom, in the control of Johnsongrass in field corn and the recommendation is to use 4 lbs of 10% active ingredient material per acre.
How many pounds of actual herbicide would you apply per acre?

2. Let's suppose you want to apply 2 lbs of actual Aatrex material per acre. How many pounds of 80W Aatrex would you need to apply per acre? How much Aatrex would you need to 300 gallons of water, apply 20 gallons per acre.

V. The below section will test for lesson number 5.

A. Make recommendations for the following situations, giving one herbicide and rate per acre for Oshkosh soil, (clay).

1. Control primarily annual weeds in corn.

2. Control broadleaf plants in corn.

3. Control mixed stands of annual broadleaf and grassy weeds in soybeans.

4. Control grassy weeds in grain which has alfalfa in it.

5. List four simple rules which will reduce the risk of herbicide residue damage, if they are followed.

a.
b.
c.
d.

6. Which of the following herbicide treatments provides consistently better weed control, pre-emergence or post-emergence application? Why?

7. Should the cultivating of corn be done if an effective herbicide is used on hard crusty soils? Why?

WEEDS AND CONTROLS

Unit One

Lesson 1 - Principles of weed control

Lesson 2 - Weed identification

Lesson 3 - Weed Controls

Lesson 4 - Dosage Calculation

Lesson 5 - Herbicides, Use and Recommendations

Student Section

INTRODUCTION

Weeds are one of the most expensive items for a crop farmer to control. They reduce the yield and the quality of the individual crop. Students employed in the various fields of agri-business need to understand the problems of weeds and their control. These various occupations include forestry, wildlife, soil conservation, farming and horticulture jobs.

The lessons in this learning pac are designed to introduce the subject to the student. The student should finish this exercise in 2 1/2 weeks.

OBJECTIVES

1. The student will be able to identify 30 of the 34 definitions related to weed control.

Annual	Active ingredient	Brush Control
Absorption	Band Application	Contaminate
Biennial	Carrier	Defoliant
Concentrate	Contact Herbicide	Herbicide
Diluent	Dormant	LD 50
Perennial	Label	Noxious Weeds
Summer Annual	Pesticides	Post-emergence treatment
Winter Annual	Residue	Pre-planting treatment
Solvent	Spray Drift	Pre-emergence treatment
Weed	Sufractant	Weed control
Warranty Clause	Simple Perennial	Bulbous Perennial
Creeping Perennial		

2. List the four agents that spread weeds and be able to provide examples of each.

3. List six methods of controlling weeds and be able to provide an example of each.

4. List the four groups of plants and, based upon the length of life cycle, give an example of each.

5. Be able to list four noxious weeds for Wisconsin.

6. On an examination the student will be able to accurately identify the below twenty-four worst weeds in Wisconsin. Identification will be made from transparencies, pictures or plant samples. Each weed will be identified by its life cycle. The 24 worst weeds are:

a. Leafy Spurge	m. Dodder
b. Perennial Sowthistle	n. Redroot
c. Field Bindweed	o. Lambsquarter
d. Wild Mustard	p. Ragweed
e. Yellow Rocket	q. White Cockle
f. Pennycress	r. Orange Hawkweed
g. Hoary Alyssum	s. Oxeye Daisy
h. Barnyard Grass	t. Bull Thistle
i. Crabgrass	u. Curly Dock
j. Foxtail	v. Poison Ivy
k. Wild Buckwheat	w. Quack Grass
l. Smartweed	x. Canadian Thistle

7. The student will be able to:

   a. list the three methods of controlling weeds.
   b. recognize the meaning of the following terms and how they relate to weed control.
      tillage secondary tillage certified seed
      primary tillage
   c. write 5 reasons for cultivation.

8. The student will be able to:

   a. recognize the parts of a sprayer.
   b. draw the four different types of sprayer pumps and know the advantages and disadvantages.
   c. draw the 4 types of nozzles.
   d. be able to relate the best time to change nozzles when using the brass nozzles.

9. The student will be able to solve the following types of problems:

   a. The amount of actual herbicide to use per acre, given the rate of application of commercial material per acreage and the percent of active ingredients in the herbicide.
   b. The amount of commercial material to use per acre if given the rate of application in terms of active herbicide or pesticide per acre and the percent of active ingredients.
   c. Solve acreage determination problems and the rate of application.
   d. Explain how to calibrate a field sprayer.

10. Through the use of current University of Wisconsin weed control information, you will be able to list and discuss six factors which need to be considered in selecting a weed control program for row crops like corn and soybeans.

11. In regard to weed control in corn and soybeans, you will be able to name one herbicide and provide the application recommendations for that herbicide, in each of the following six weed situations.

   a. Mixed stands of an annual broadleaf and grassy weeds in corn.
   b. Primarily annual grasses like the foxtails, crabgrass, and fall panicum in corn.
   c. Annual and perennial broadleaf weeds only in corn.
   d. Quackgrass in corn.
   e. Yellow Nutsedge (nutgrass) in corn.
   f. Mixed stands of annual broadleaf and grassy weeds in soybeans.

LESSONS

Lesson 1 - Principles of Weed Control

The basic terms and principles of weed control are necessary to understand the subject of weed control. The terms and method of control of weeds are necessary to control weeds.

Objectives:

1. The student will be able to identify 30 of the 34 definitions related to weed control.

Annual	Active Ingredient	Brush Control
Absorption	Band Application	Contaminate
Biennial	Carrier	Defoliant
Concentrate	Contact Herbicide	Herbicide
Diluent	Dormant	LD 50
Perennial	Label	Noxious Weeds
Summer Annual	Pesticides	Post-Emergence Treatment
Winter Annual	Residue	Pre-Planting Treatment
Solvent	Spray Drift	Pre-Emergence Treatment
Weed	Sufractant	Weed Control
Warranty Clause	Simple Perennial	Bulbous Perennial
Creeping Perennial		

2. List the four agents that spread weeds and will be able to provide examples of each.

3. List six methods of controlling weeds and will be able to provide an example of each.

4. List the four groups of plants and based upon the length of life cycle give an example of each.

5. Be able to list four noxious weeds for Wisconsin.

Instructions:

Do all of the learning activities to master the above objectives. All written material will be handed in at the end when the Learning Pac is finished. The definitions will be obtained from the slide presentation and the information sheet.

Learning Activities:

1. Read information sheet number 1.

2. View the slide presentation, Weed Control (10).

3. The student will write the definitions of the below terms in his notebook, neatly and completely. Definitions will be provided by instructor in his lecture or use Tape #12.

Annual	Active Ingredient	Brush Control
Absorption	Band Application	Contaminate
Biennial	Carrier	Defoliant
Concentrate	Contact Herbicide	Herbicide
Diluent	Dormant	L D 50
Perennial	Label	Noxious Weeds
Summer Annual	Pesticides	Post-Emergence Treatment
Pre-Planting Treatment	Residue	Winter Annual
Pre-Emergence Treatment	Solvent	Spray Drift
Weed	Surfractant	Weed Control
Warranty Clause	Simple Perennial	Bulbous Perennial
Creeping Perennial		

4. Read Chapter 1 and 2 in Weed Control Cultural and Chemical.

5. Answer the following questions.

   a. List the three groups of plants and their subdivision based upon the length of life cycle, describe each type and give an example of each.

      1.
         (a)
         (b)
         (c)

      2.
         (a)
         (b)
         (c)

      3.
         (a)
         (b)
         (c)

   b. List the five methods by which weeds may be propagated and give example of each.

      1.
      2.
      3.
      4.
      5.

   c. List three types of herbicide application based upon coverage of the soil surface.

      1. 2. 3.

   d. List four agents which tend to spread weeds and give an example of each.

      1. 3.

      2. 4.

e. List and describe the three methods of herbicide application based upon when the herbicide is applied.

1. 2. 3.

f. List the six methods that can be used to control weeds and give an example of each.

1.

2.

3.

4.

5.

6.

g. List and describe the types of herbicides according to how they kill weeds, explain the difference between selective and non-selective.

Self-Evaluation:

Study the definitions and the questions answered from the slide presentation.

Information Sheet #1

CLASSIFICATION, IDENTIFICATION, AND SPREADING OF PROBLEM WEEDS *

Classification of Weeds

What do you need to know about weeds to be able to control them? If you want successful control or eradication of weeds in your fields, you will need some knowledge of their life or growth habits. This chapter will help you define your weed problem before you look for the control method. Weeds differ from one another in more than appearance and can be classified into groups depending upon the length of time they live. They differ also in life cycles, root systems, rate of growth, and chemical resistance or tolerance. A classification system based on life span follows.

Annuals

Annuals are plants that live only one year or less. During this period, they mature and produce seeds, thus completing their life cycle. Annuals are normally considered easy to control when small, but they are very persistent due to their fast growth and abundant production of seed. All methods of controlling annuals have one principal purpose - the prevention of seeding. Annuals should be destroyed before or during early flowering. They usually cost less to control than perennials. Most common field weeds are of this group. Annuals are further classified into two types as follows:

Summer annuals. Summer annuals germinate in the spring, produce seed, make most of their growth during the summer, and usually mature and die in the fall. Their seeds lie dormant in the soil until the following spring, then they begin another life cycle. Cocklebur, foxtail, smartweed, ragweed, pigweed, lambsquarters, and crabgrass are examples of this group.

Winter annuals. Winter annuals remain dormant in the summer then germinate in the fall and winter and usually produce seed in the spring or early summer before dying. Cheat, henbit, little barley, wild mustard, and downy bromegrass are examples.

Biennials

Biennials are plants that require two years to complete their life cycle. The first year they produce a well-developed root below the ground and a leafy rosette type of vegetative growth above the ground. They are dormant during the winter, but during the next year's growth a flower stalk elongates, produces seed, and dies. Burdock, bull thistle, wild carrot, and wild parsnip are common biennials. Biennials should be destroyed during the rosette stage. They usually grow in pastures, roadsides, or other uncultivated areas.

* Material taken from Weed Control Culture and Chemical
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Perennials

Perennials are plants that normally live for more than two years. They not only propagate by seed, but many of them produce such underground structures as rhizomes, budding roots, tubers, or bulbs. The aboveground portion of the plant may die back each year, but in the spring new growth develops from the underground parts. Because of their extensive root systems and ability to produce seeds, eradication or control is difficult. Perennials may be classed according to their method of reproduction: simple, bulbous, and creeping.

Simple perennials. This type perennial spreads normally by seed. Injured or cut root pieces may produce new plants, but they have no normal means of spreading vegetatively. For example, a dandelion, curly dock, or plantain root cut in half may produce two plants. The roots are usually fleshy and may grow very large. See Figure 1.

Bulbous perennials. These reproduce by seed, aerial bulblets, and underground bulblets. Examples are wild garlic and wild onion. Wild garlic flowers usually produce only aerial bulblets. Seed is only occasionally formed. New bulbs form during the growing season on the old bulb base. See Figure 2.

Creeping perennials. These reproduce by seed, creeping roots, stolons (creeping aboveground stems), and rhizomes (creeping belowground stems). There are many such perennials - Canada thistle, field bindweed, Johnsongrass, quackgrass, and oxeye daisy. See Figures 3 and 4.

Some weeds, such as nutsedge - nutgrass, maintain themselves and propagate by means of tubers which are the enlarged, fleshy, terminal portion of rhizome bearing buds. See Figure 5.

The classification of weeds and example given here are mainly for Ohio. In other regions the life span of a certain weed may vary because of climate and may vary even in the same climate. An annual weed where winters are severe may be biennial where winters are mild. Some plants which are biennial in one region may be perennial in another.

Primary noxious weeds include the following:

bindweed	Johnson grass	Russian knapweed
*quackgrass	white top or daisy fleabane	
*Canada thistle	*perennial sow thistle	*leafy spurge

Secondary noxious weeds are somewhat less difficult and costly to control. Lots of crop seeds may contain up to one-fourth of one percent (.25%) of secondary noxious weed seeds.

Secondary noxious weeds include the following:

dodder	wild garlic	French weed
horse nettle	wild onion	buckhorn plantain
corn cockle	curled dock or sour dock	

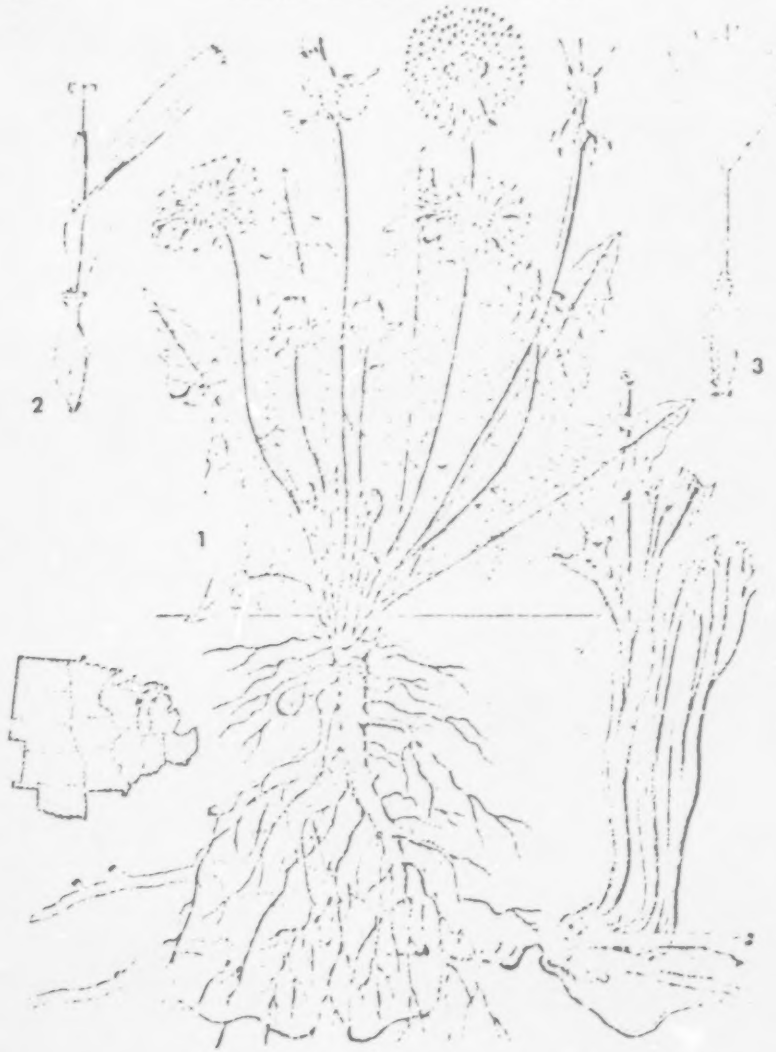


Figure 1 - The dandelion is an example of the simple perennials. These plants usually spread by seeds. New sprouts can come from roots or parts of roots that have been cut off. 1. plant in flower; 2. single ray flower; 3. seed; 4. roots. Weeds of the N.C. states, N.C. Regional No. 36.

* Noxious weeds in Wisconsin

Figure 2. Wild garlic and wild onion are examples of bulbous perennials. Wild garlic-1, flower cluster; 2. old bulb and bulblets; 3. underground bulblets; 4. entire plant. Aerial bulblets form in a cluster at the top of the stem. Wild onion-5. entire plant; 6. flower cluster; 7. old bulb. Does not produce underground bulblets. Weeds of the N.C. states, N.C. Regional No. 36.

Figure 3. Heal - all in a creeping perennial which spreads by seeds and runners which root at the nodes. 1. plant in flower; 2. prostrate stem; 3. single flower; 4. seed. Weeds of the N.C. states, N.C. Regional No. 36.

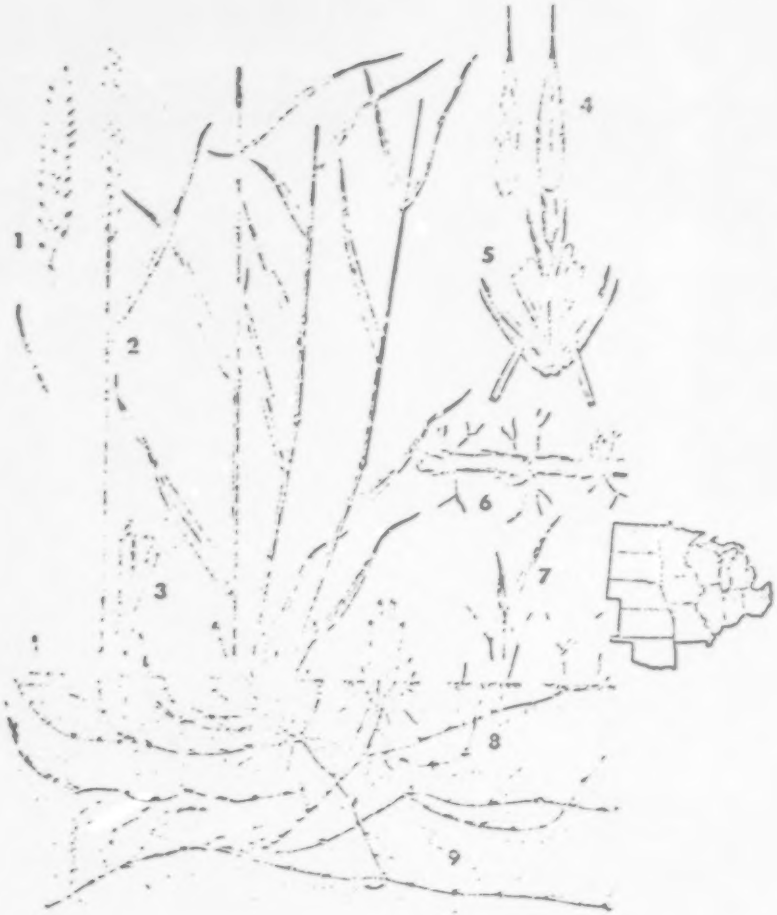


Figure 4. Quackgrass is a creeping perennial which spreads by seeds and underground roots. 1. spike; 2. stems and leaves; 3. auricle and ligule; 4. seed; 5. spikelets; 6. buds on rootstock; 7. new shoots; 8. origin of new shoots; 9. roots. Weeds of N.C. states, N.C. Regional No. 36.

Figure 5. Yellow nutgrass is a perennial which reproduces by see and tubers on roots. 1. whole plant; 2. seed; 3. tuber. Weeds of the N.C. states N. C. Regional No. 36.

LESSONS

Lesson 2 - Weed Identification

Identification of weeds is important so that a proper method can be used to destroy them. If the wrong cure is used it could destroy the crop, or permanantly damage the soil for years.

Objectives:

1. On an examination the student will be able to accurately identify the below twenty-four worst weeds in Wisconsin. Identification will be made from transparencies, pictures or plant samples. Each weed will be identified by their life cycle.

   The twenty-four worst weeds are:

   A. Leafy spurge
   B. Perennial sowthistle
   C. Field bindweed
   D. Wild mustard
   E. Yellow rocket
   F. Pennycress
   G. Hoary alyssum
   H. Barnyard grass
   I. Crabgrass
   J. Foxtail
   K. Wild buckwheat
   L. Smartweed
   M. Dodder
   N. Redroot
   O. Lambsquarter
   P. Ragweed
   Q. White cockle
   R. Orange hawkweed
   S. Oxeye daisy
   T. Bull thistle
   U. Curly dock
   V. Poison ivy
   W. Quackgrass
   X. Canadian thistle

Learning Activities:

1. Collect and identify 10 weeds from your area, use the book Weeds of North Central States for a guide.

   A. Press these weeds

B. Use the labels provided and fill it out completely

C. Place the weed on a cardboard and cover with contact paper (instructor will demonstrate)

2. For the 24 weeds listed in the objective number 1, find their life cycle. Make a printed list of each in your notebook, use Weeds of the North Central States as a guide.

3. Study and know the prepared mounts available from the instructor. (A collection of the 24 worst weeds)

Self-Evaluation:

Review the inventory sheet and the questions answered. Identify the 24 weed mounts and know their life cycle.

Name_____ Name_____

Period_____ Period_____

Weed_____ Weed_____

Life Cycle_____ Life Cycle_____

Location Found_____ Location Found_____

Control_____ Control_____

Name_____ Name_____

Period_____ Period_____

Weed_____ Weed_____

Life Cycle_____ Life Cycle_____

Location Found_____ Location Found_____

Control_____ Control_____

Name_____ Name_____

Period_____ Period_____

Weed_____ Weed_____

Life Cycle_____ Life Cycle_____

Location Found_____ Location Found_____

Control_____ Control_____

Name_____ Name_____

Period_____ Period_____

Weed_____ Weed_____

Life Cycle_____ Life Cycle_____

Location Found_____ Location Found_____

Control_____ Control_____

LESSON

Lesson 3 - Weed Controls

There are 3 basic methods to control weeds and they each have to be understood so that they can be used effectively alone or together.

Objectives:

1. The student will be able to:

   A. List the three methods of controlling weeds.

   B. Recognize the meaning of the following terms and how they relate to weed control.

      Tillage — Primary tillage
      Secondary tillage — Spring tillage
      Certified seed

   C. Write 5 reasons for cultivation.

Learning Activities:

1. Read information sheet number 2.

2. Answer the questions on inventory sheet number 1 concerning the information sheet.

3. Listen to tape #2 on certified seed.

Self-Evaluation:

Review the questions and the following sheet.

Information Sheet #2

METHODS OF CONTROLLING WEEDS

PRACTICES NECESSARY FOR WEED CONTROL

We have studied some of the characteristics of weeds. Now we will consider how we can take advantage of some of these characteristics to control certain weeds. Some practices that may be applied are as follows:

1. Prevent seed formation.

   One of the most effective weed control methods is for each farmer to prevent as many weeds as possible from going to seed. Since annuals and biennials reproduce only by seed, they would eventually die out as the seeds present in the soil germinated and the plants killed. Keeping perennials from going to seed would also eliminate one of the methods by which these plants spread.

2. Depletion of root food reserves in perennials.

   During the growing season, perennials build up food reserves by the process of photosynthesis in the leaves of the plant. The excess food is stored in the underground portion of the plant. After the tops die down in the fall, the food reserves are carried through the winter in the roots. In the spring the underground part of the plant sends up new top growth. This depletes the food reserves stored in the roots until blooming time. After blooming the food reserves are once again built up in the underground portion of the plant.

   One effective control measure for perennials removes the upper part of the plant at the time the root food reserves are at their lowest point. This must be done early enough in the blooming period to keep the tops from going to seed even though they have been removed from the roots. Removing the top of the plant stops food manufacturing by photosynthesis. In addition, the root food reserves are further depleted by being required to send up new stems and leaves. If this process is repeated often enough the perennial will starve out. This process is illustrated in Figure 6.

3. Taking advantage of plant characteristics.

   Weed and crop plants vary also in rate of growth, morphological characteristics (form and structure of plants), and chemical resistance or tolerance.

   Three methods of weed control used by farmers are cultural, biological, and chemical. Most of our weeds can be economically controlled by applying a combination of the three methods.

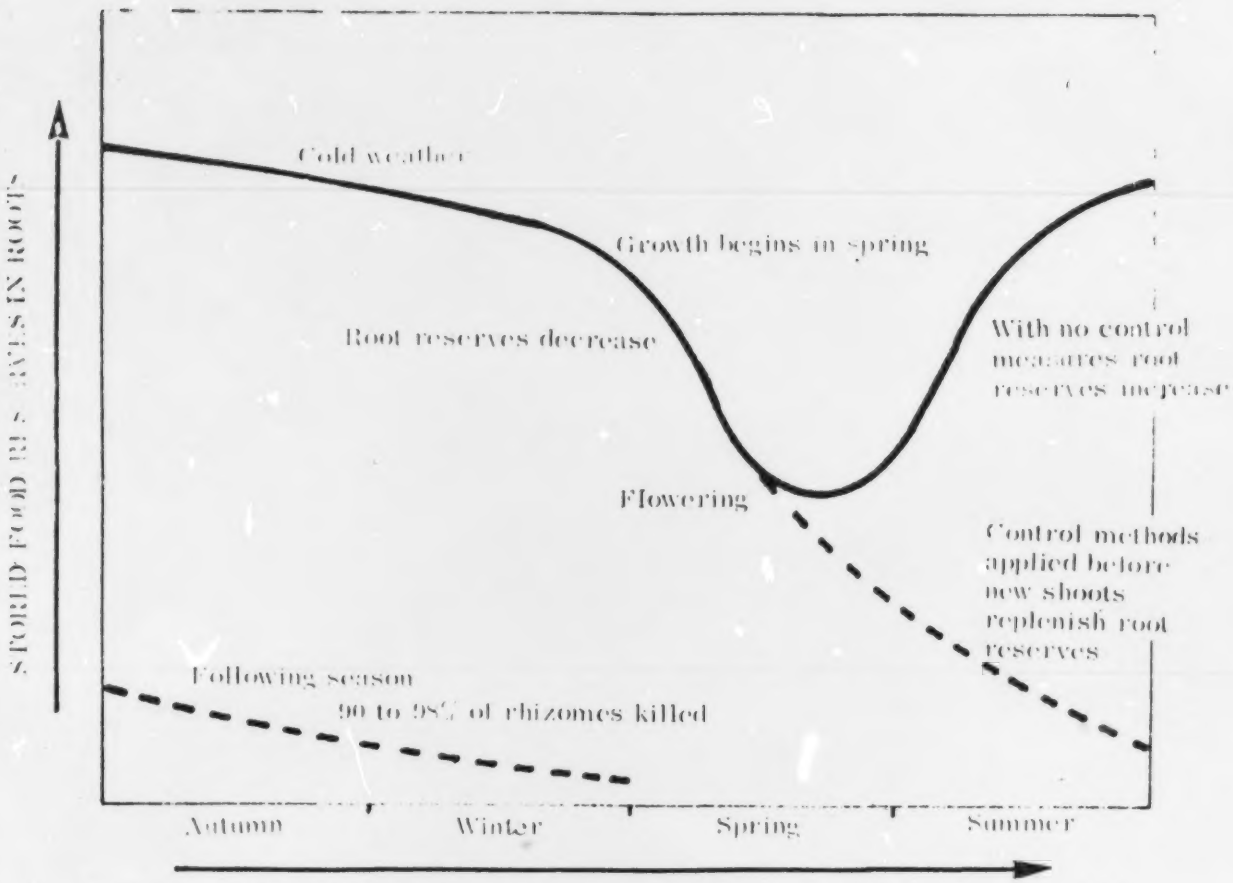


Figure 6 Perennials use stored food reserves in the spring to start new plant growth. If the new growth is continually removed before the root reserves are replenished the plant will eventually die. USDA L523, "Canada Thistle and Its Control."

Cultural or Mechanical Control

Cultural or mechanical weed control includes tillage, moving, burning, mulching and hoeing; even hand pulling is justified under some conditions. The use of cultural practices is basic in any effective weed control program.

1. Tillage has long been one of the principal means of controlling weeds. Different times and methods of tillage are discussed as follows:

a. Primary tillage consists of plowing, disking, and field cultivating which perform major operations in working the soil. An additional benefit is that these operations are effective in killing weeds.

Deep tillage operations, such as plowing, bring lower layers of soil to the surface. This also turns up the underground parts of weeds. The exposing of the underground parts of perennials can be very damaging to these plants.

(1) Drying out will kill the underground parts of the plant which are turned up. An example is Johnsongrass. See Figure 19.

(2) Freezing may kill the exposed underground parts of plants which are turned up by fall plowing.

(3) Plowing will turn weeds under and kill them by smothering.

The plow is also a very effective tool in killing annual weeds. However, turning up lower layers of soil also turns up other weed seeds. As we have seen, weed seeds remain viable in the soil for long periods of time.

b. Secondary tillage consists of shallow cultivation such as that used to prepare a seedbed after primary tillage. Such implements as the disk, the harrow, springtooth harrow, and rotary hoe may be used. Secondary cultivation may also be used as a weed control measure.

Seedbed preparation destroys many of our weeds. It has been estimated that 90 percent of the annual weeds germinate during the period of April 15 to May 30. If the seedbed is prepared the last of April, a large porportion of the annual weeds will not have germinated. On the other hand, if the final seedbed is prepared on May 15 or later, the bulk of the annual weed seeds will have germinated and will be killed in the process.

Spring tillage may be used to control perennials. Breaking up the surviving rhizomes in the spring causes more buds to germinate. The time to start spring tillage is before flowering when root reserves are lowest. Repeated tillage 8 to 14 days after shoots emerge is then necessary to deplete root reserves. See Figure 1.

Secondary tillage operations, unless they are very shallow, will turn up other groups of weed seeds. Thus the control of one group of weeds may be the cause for the start of another. Unless other control measures are employed, the secondary tillage operation will need to be repeated at intervals.

c. Minimum tillage consists of preparing a seedbed without the traditional primary and secondary tillage operations. There are many different variations of minimum tillage in use today. Such operations leave a loose soil surface with a dry topsoil layer which discourages germination and growth of weed seedlings.

d. Blind tillage is the use of tillage equipment after the crop is planted. The entire soil surface is covered. In some cases a crop such as corn or soybeans may have started to emerge.

Newly germinated weed seedlings are easily killed if the soil is stirred so that their roots are broken loose and exposed to the elements. This is commonly referred to as the "white stage" because of the color of the young weed seedlings before they emerge. When weed seedlings emerge and form leaves, blind tillage is less successful. Such tillage disturbs the environment so that the weed seedlings will die. The crop seeds are larger and deeper than the weed seeds. Also, the crop is better established and little or no damage is done by blind tillage. If the rotary hoe is used it should be pulled at high speed. The tines will punch holes in the soil surface as they enter and throw dirt on the way out. This action will leave the soil surface loose and dried out. It will also throw out many of the weed seedlings so they will dry out and die.

e. Shovel cultivation is usually practiced with row crops.

Killing small established weeds. After the weeds have become established, but are still small, they may be controlled by shovel cultivation which loosens or cuts the root system sufficiently to dry them out. If soils are moist or if rain occurs soon after cultivation, the weeds may take root again.

Completely cultivating out the extensive underground root system of perennials is quite difficult. Even if the root systems are exposed on the surface of the soil, they will often take root and establish new plants. While such cultivation will weaken the perennials, it will usually not control them.

Smothering weeds by covering. Covering the growing points by cultivation will kill most annual weeds. However, covering is only partly effective against weeds with underground reproductive systems capable of sending up new growth. This includes such weeds as Canada thistle and quackgrass. Repeated covering is required until the root reserves are used up as described at the start of this chapter.

Shallow cultivation. Cultivating two inches or less in depth is better than deeper cultivation with corn. Deep cultivation will cut many of the corn roots. The cultivator shovels should pass at least four inches away from the plant. The roots will be injured less and yields will be increased as indicated in Figure 7.

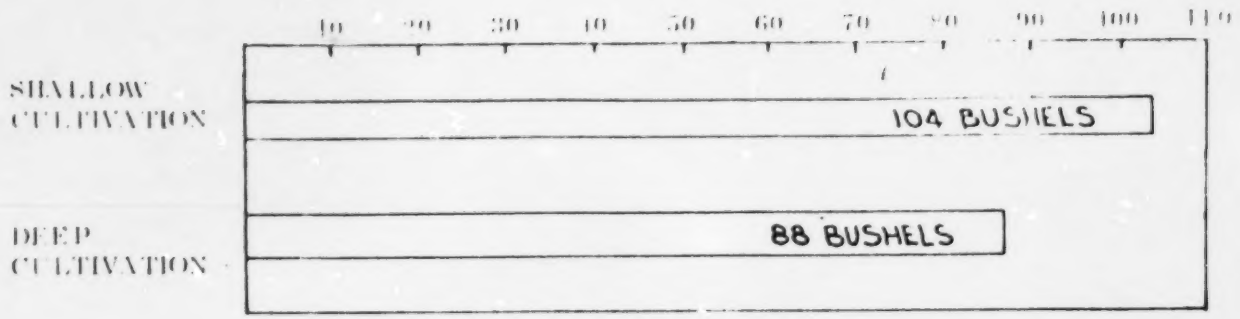


Figure 7

f. Deep cultivation reduces corn yields due to root damage.

After planting the light colored soils require more cultivation than the dark soils regardless of other weed control methods you use. Cultivation once or twice before layby time is required for top yields. Cultivation improves light colored soils in the following ways:

(1) Breaks the surface crust formed by rainfall.

(2) Improves soil texture.

(3) Increases water infiltration up to 50%, thus reducing runoff.

(4) Reduces evaporation up to 2.5 inches during the growing season.

(5) Increases aeration in soil for plant roots.

(6) Stimulates root growth.

Because crusting soils should be cultivated for optimum yields, herbicides may only be needed in a band application over the row except to control unusual weed problems. Some weeds may escape pre-emergence herbicides because of weather. The best time for you to cultivate these weeds is from germination to 1/4 inches in height.

Many experiment station tests have shown that the cultivation of crusting soils will increase yields considerably. In Wisconsin, proper cultivation has increased yields 5 to 10%. Figure 8 shows the increase in yields from using both herbicides and cultivation compared to either treatment alone on crusting soils for corn and soybeans.

g. No tillage involves the use of a special planter with attachments which prepare a seedbed only in the rows being planted.

The strips which are worked leave a dry loose layer of soil on the surface which discourages the germination of weed seeds. The corn is seeded deeper in moist soil and will germinate under normal growing conditions. The area between the rows is not worked and weeds must be controlled here with herbicides. Such procedures are still being tested by farmers and researchers so it would be best to obtain current recommendations for such practices.

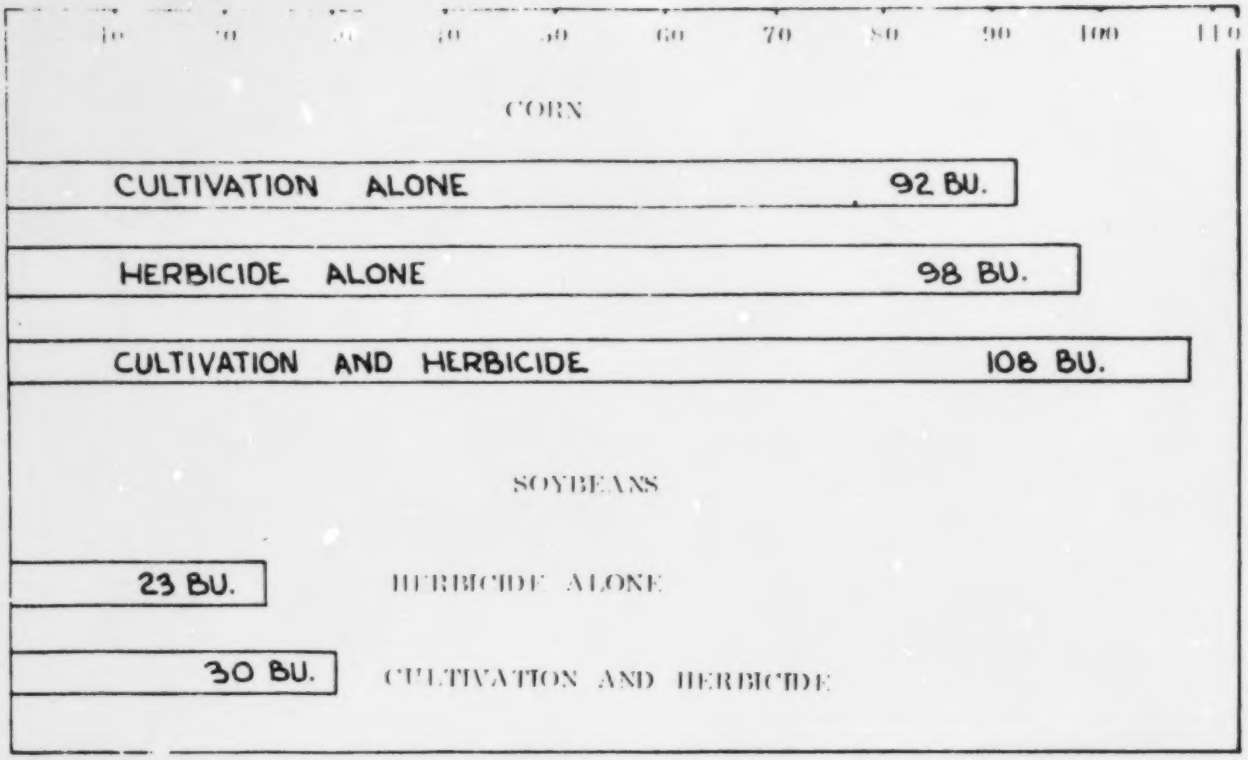


Figure 8 Herbicide treatments plus cultivation is the best combination on crusting soils.

h. Mowing. Mowing may be used to control weeds in areas not commonly cultivated. Mowing controls weeds in the following:

(1) Keeps weeds from going to seed. It is important not to miss any of the weeds in the area being mowed. The heighth of mowing must be below the seed-producing area of the plant. Such plants as crabgrass, dandelion, and plantain grow close to the ground and seed production can not be prevented by mowing.

If the weeds are mowed too near maturity, they will continue to develop seed. This is because fertilization has taken place and seed only has to dry to mature, which can be accomplished after the weed is cut.

(2) To deplete root reserves in perennials. For perennials, start mowing when plants reach the early bud stage. Repeat the rowings to decrease the food reserves in the roots.

i. Burning. Weeds may be burned with a flame burner, but it usually takes as much time, if not more, to burn an area than to mow it. The cost may also be greater. The burner is, however, adapted for use where it is difficult to use a mower or hand cutting equipment.

Burning as a method of weed control has its limitations, largely because it is not done at the critical stage of the plant's life. Usually burning is done after the plants are mature and dry. By this time many of the seeds have falled to the ground, and unless the burning process is slow and the heat maintained on the spot for a period of time, many of the seeds lying close to the ground go unharmed. Railroads, by using special burning equipment are still using this method to control weeds growing on their right-of-ways.

In the dry seasons, you may need a special permit to burn weeds due to the hazard of the fire spreading, especially in forest areas. Check with your local fire department if you are planning to burn weeds with a flame burner or by other means.

j. Mulching. Straw mulches, building paper, or black plastic may be used to smother small patches of weeds. Care must be taken that the cover is large enough so the weeds will not come up around the outer edge. These methods are not practical for large operations. A loose straw mulch will kill annuals but not perennials. Canada thistles will come up through straw but not through a continuous black plastic cover.

k. Cutting, hoeing, and pulling. In general, we are living in an area of mechanization, but hand operations are still very important in weed control. Because of the "back breaking" character of the method, such practices are confined to small

areas or to the widely scattered weeds in larger areas. Thousands of dollars are spent each year in vegetable areas for hand removal of weeds. It has been clearly demonstrated in practice that such weeds as wild morning-glory for example can be eradicated by hoeing. The hoeing must be often and regular in order to weaken the rootstocks to the extent that no more shoots will be sent up. In hoeing, care must be exercised to be certain that the plants are cut below the crowns.

1. Weed prevention when seeding. Using weed-free seed is a most important step in the job of weed prevention. To determine the quality of seed Wisconsin farmers were using a drill box survey of oats. The findings were as follows:

   Of the non-certified oat seed samples:

   (1) 29% contained secondary noxious weeds with an average of 841 noxious weed seeds per bushel.

   (2) 50% contained common weed seeds with an average of 586 seeds per bushel.

   (3) 54% contained other crop seeds with an average of 1344 other crop seeds per bushel.

   (4) Some of the worse samples contained the following number of seeds per bushel:

	Noxious Weeds	Common Weeds	Other Crop Seeds
a.	12,800	--	--
b.	2,496	832	256
c.	2,944	--	320
d.	3,392	--	1,280
e.	1,024	320	1,472

   Of the certified seed samples, not a single one contained primary or secondary noxious weed seeds. Using certified seed is one means of obtaining weed-free quality seed.

   If homegrown seed is to be used precaution should be taken to have the weed seeds removed by cleaning. This may be done with home-owned seed cleaners or by commercially owned cleaners.

Biological Control

Crop competition and rotation. By managing his cropping system, a farmer may grow crops that are highly competitive against certain problem weeds. The attempt is to upset the plant competition in favor of the crop. To accomplish this the farmer should follow approved practices recommended by agronomists. Some of these practices are as follows:

1. Apply adequate amounts of fertilizer according to soil test. Place fertilizer sufficiently deep in the soil to prevent weeds from getting it first. Place it the recommended distance from or under the crop to favor maximum crop growth.

2. If necessary, correct the soil pH for the crop by liming to get best fertilizer use.

3. Provide adequate drainage or irrigation for crop.

4. Plant adapted, high yielding crop varieties at the right time. For example, plant sorghum in July, not May.

5. Plant the thickest plant population (including row spacing) possible which will not cut crop yield but will crowd out weeds by shading them. Certain weeds vary in their response to shading by other plants as follows.

   a. Intolerant of shade - rough pigweed (Amaranthus retroflexus) and green foxtail (Setaria viridis).

   b. Suppressed by corn - lambsquarters (Chenopodium Album), common sunflower (Helianthus Annuus), Pennsylvania smartweed (Polygonum Pennsylvanicum), common ragweed (Ambrosia artemisiifolia), wild buckwheat (Polygonum convolvulus), common peppergrass (Lepidium virginicum), and yellow wood sorrel (Oxalis europaea).

   C. Suppressed by winter wheat - cocklebur (Xanthium pennsylvanicum), Indian hemp or dogbane (Apocynum cannabinium), prairie rose (Rosa arkansana), common milkweed (Asclepias syrica), spotted spurge (Euphorbia maculata), and field bindweed or wild morning-glory (Convolvulus arvensis).

6. Plant the crop in a rotation so that weeds of certain crops are not favored every year. Weeds often grow with crops whose life cycle and growth habits are similar. Some weed plants are closely related to crop plants, for example Johnsongrass to grain sorghums and wild grass weeds to small grains. Often the new crop in a rotation will successfully compete with weeds from the previous crop. Usually a good rotation for weed control includes both:

   a. Summer row crops and

   b. Winter or early spring grain crops

   plus strong competitive crops grown in each part of the rotation. Quick-growing crops, such as alfalfa, sweet clover, Sudangrass and sometimes wheat and rye, may be used as competition crops.

   Some examples of crop competition and rotation to control weeds are:

   a. Johnsongrass make its maximum growth in the summer at the same time as corn and soybeans, so they would be of little value in controlling Johnsongrass. However, winter grains compete with Johnsongrass and aid in breaking its life cycle. The main growth

of winter grain in late spring and early summer gives it a head start on Johnsongrass. Other perennial weeds become well established by the time small grains are harvested, for example, Canada thistle in wheat or oats,

b. Control wild mustard with corn or soybeans. Wild mustard grows most in the fall and early spring when cultural practices are being used to prepare a seedbed. Knowing the life cycle of common weeds makes control easier.

Crop competition and rotation may combine with other methods. Some examples are:

a. Combine crop competition and mowing by raising alfalfa hay to control Canada thistle. After three years very few thistles remain because alfalfa recovers quicker. (Consider also the cost of controlling alflafa weevil compared to yield and income).

b. Combine rotation with herbicides. Use 2, 4-D in grain following a 2,4-D sensitive crop in which broad-leaved weeds have become a problem as in wheat following soybeans.

Predators and disease

Biological methods also use living organisms, mostly insects, to control weeds. Examples are the Chrysolina spp. beetle to control Klamath weed on the ranges and the use of geese in strawberries.

Pasturing

Some animals, especially sheep, eat many kinds of weeds. The fields, however, should be gone over and the scattered uneaten weeds cut or destroyed before they produce seed. The pasturing of weeds that have already produced seeds will not effectively control weeds even if the animals will eat them, because many weed seeds will grow after passing through the animal's digestive system. If grazing pressure is too great, the desired forage may become too short to compete with the weeds.

Chemical Control

Weed control by chemicals (herbicides) offers the greatest potential. Herbicides often control weeds at a considerable savings over cultivation costs. In some cases, herbicides control weeds that cannot be controlled by normal tillage practices.

Any one method of weed control is not enough; it takes the well-planned integration of all of these methods into a long-range, over-all program to obtain the maximum return for your money and effort.

INVENTORY SHEET NUMBER 1

1. Why are perennial weeds more difficult to control?

2. Define the following terms.

   Tillage
   Primary tillage
   spring tillage
   certified seed

3. List the 5 reasons for cultivation. Explain which practice is the most important reason.

4. Name two weeds that can not live in shade.

   1.

   2.

5. The advent of herbicides has eliminated cultivation in Winnebago County. Do you agree or disagree and state specific figure for the way you feel this question should be answered.

6. If a farmer had a field which had the following weeds, lambsquarter, sunflowers and common ragweed, what crop would you plant to control these weeds and explain why you picked that crop.

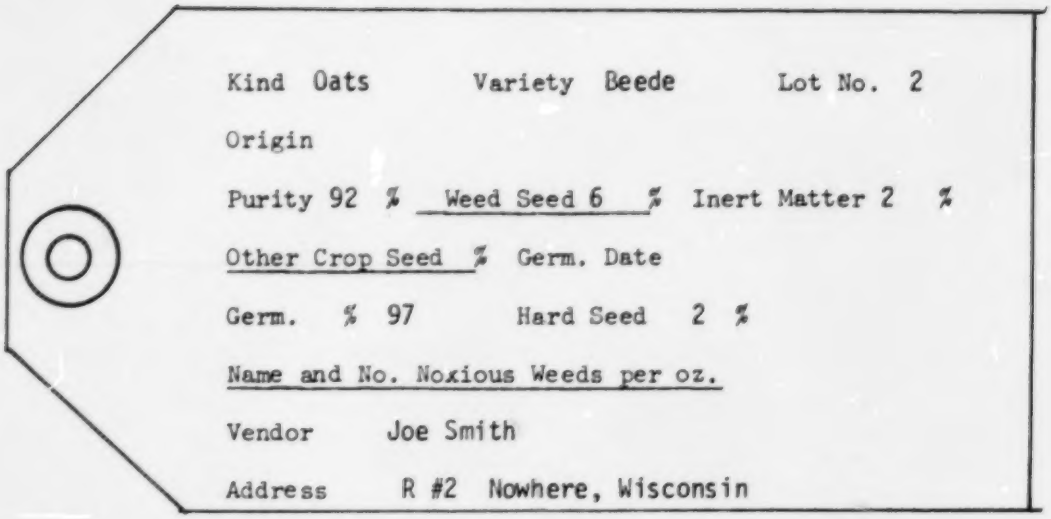
7. How would you control a field of wild mustard?

8. List 3 methods to control weeds

   a.
   b.
   c.

9. What season of the year is best to control perennials and why?

A CERTIFIED SEED TAG


Kind Oats Variety Beede Lot No. 2
Origin
Purity 92 % Weed Seed 6 % Inert Matter 2 %
Other Crop Seed % Germ. Date
Germ. % 97 Hard Seed 2 %
Name and No. Noxious Weeds per oz.
Vendor Joe Smith
Address R #2 Nowhere, Wisconsin

   a. What percent of weeds are in this sample?_____

   b. What seeds will be found in this bag? _____

   c. Who is selling the seed?_____

   d. What variety of seed is this?_____

   e. What is the main reason for buying certified seed?_____

   _____

10. Do you consider soils in your area "crusty soils"?

    _____yes _____no

a. If you answered yes, then if a 10 acre field of corn normally yields 110 bushels using herbicides what would be the yield if you cultivated.

b. How much additional income would this create if corn is selling for $1.70 per bushel?

LESSONS

Lesson 4 - Sprayers and Dosage Calculations

Objectives:

The Student will be able to:

1. Recognize the parts of a sprayer.
2. Draw the four different types of sprayer pumps and know the advantages and disadvantages of each.
3. Draw the four types of nozzles.
4. Be able to relate the best time to change nozzles when using the brass nozzles.
5. Be able to solve the following types of problems:
   a. The amount of actual herbicide to use per acre, given the rate of application of commercial materials per acreage and the percent of active ingredient in the herbicide.
   b. The amount of commercial material to use per acre if given the rate of application in terms of active herbicide or pesticide per acre and the per cent of active ingredient.
   c. Solve acreage determination problems and rate of application.
   d. Explain how to calibrate a field sprayer.

Learning Activities:

1. Read information sheet number 3.
2. Read information sheet number 4.
3. View film strip (#11) Calibrating Field Sprayers
4. Answer inventory sheet number 4 on the film strip.
5. Read information sheets number 5-7.
6. Do inventory sheet numbers 5 and 6.

Self-Evaluation:

Review the questions and the inventory sheets.

INFORMATION SHEET #3

GEAR PUMPS

ADVANTAGES	DISADVANTAGES
Self Priming	Spur gear bronze pumps sensitive to suspension materials
Positive Displacement	Must use rather large models for good output at PTO speed.
Moderate Cost	1" spur gear pump has same output as 6 roller nylon roller pump.
	Maintenance: lower cost pumps not economically repairable.

Recommended primarily for handling oil and corrosive rather than abrasive materials. Satisfactory for many liquid spray chemicals.

CENTRIFUGAL PUMPS

ADVANTAGES	DISADVANTAGES
Handles suspensions well	Low pressure: normal 40 psi max.
High capacity	Priming capacity NONE on straight centrifugal. Must have positive suction head or be primed with foot valve
Rotary seal can be varied for different uses	
Needs no relief valve. Can use globe valve for by-pass	Easy to vapor lock unless carefully mounted and bleeder used.
Simple maintenance	Must run at high speed, cost of gear box or belt drive relatively high
	Not positive displacement

Although high initial cost compared to roller pumps; this can be lowest in terms of overall cost providing pressure limit is satisfactory.

PISTOM PUMPS

ADVANTAGES	DISADVANTAGES
Wear Resistant	Cost approximately double comparable roller pump
Handles suspensions well	Pulsation must be compared by surge tank
Good priming characteristics in Models 10 GPM and larger	The size and weight limits direct PTO mount to 10 GPM models
Positive displacement	
High pressure capability	

For the professional sprayer, the piston pump can be his best investment. Piston pumps will cover a great variety of materials, wide range of pressures. The 20 and 25 GPM models will cover most spraying needs and although high priced compared to the other pumps, the overall life makes them economical for anyone demanding a rugged job.

Not normally recommended for liquid fertilizer pumping unless specifically made for this purpose.

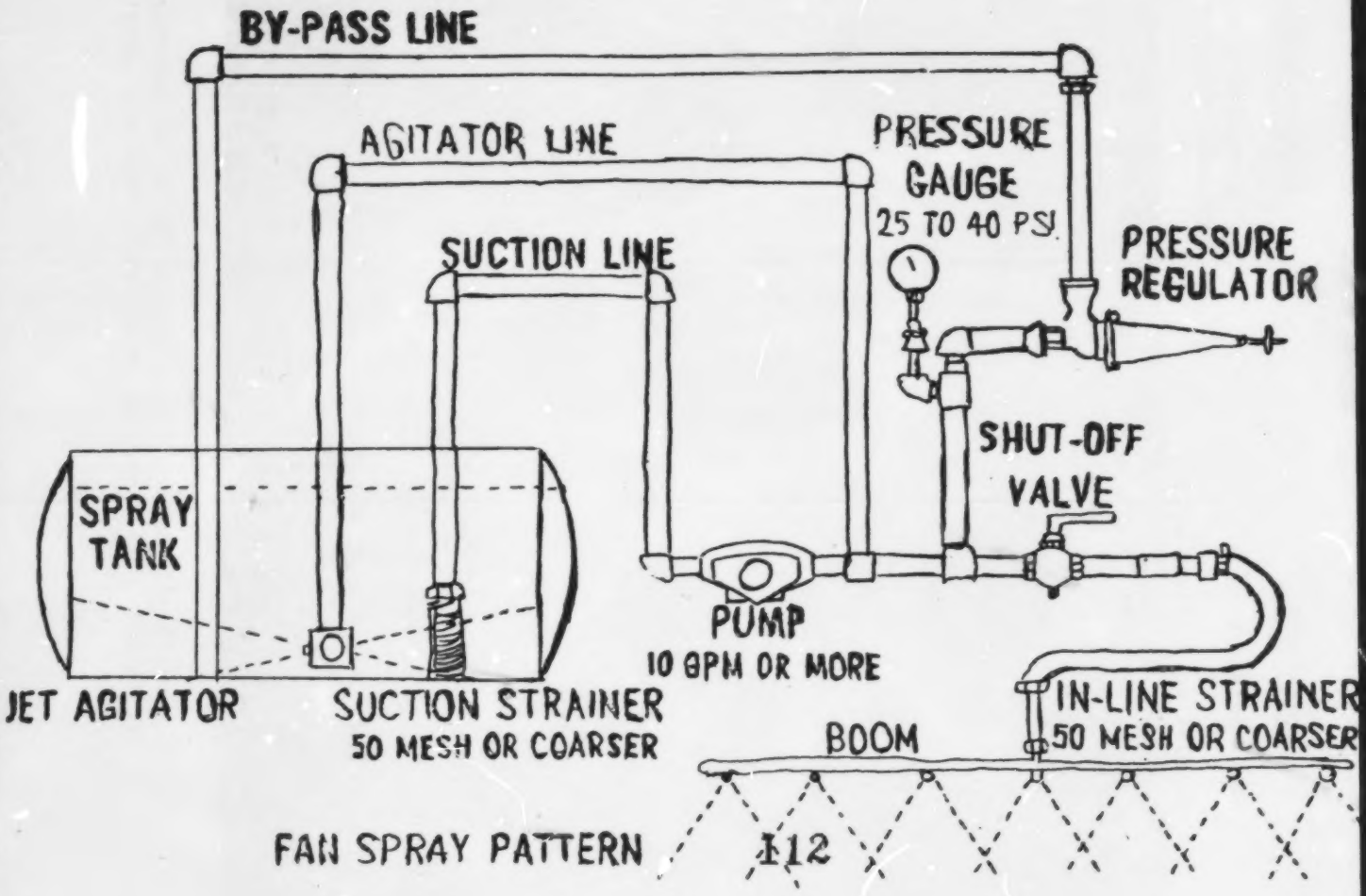
ROLLER PUMPS

ADVANTAGES	DISADVANTAGES
Low initial cost	Sensitive to sharp, coarse abrasive such as sand, barrel scale
High output in GPM compared to size	
Good priming characteristics	
Can be repaired several times and when handled properly give good life	
Available in Ni-Resist for corrosion resistance	

Roller pumps have gained and held popularity due to convenience, cost, and efficiency. When used with proper care, they are lowest cost for general sprayer service.

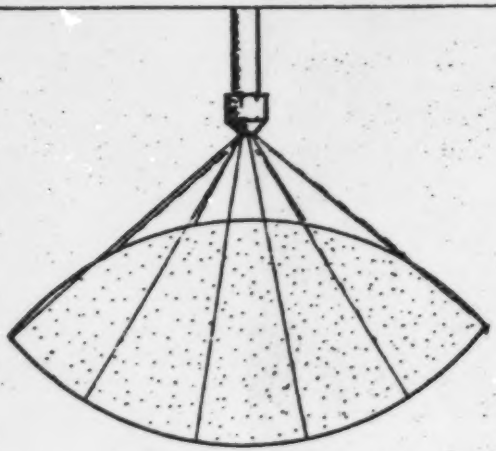
MAIN PARTS OF A SPRAYER

INFORMATION SHEET NO. 4

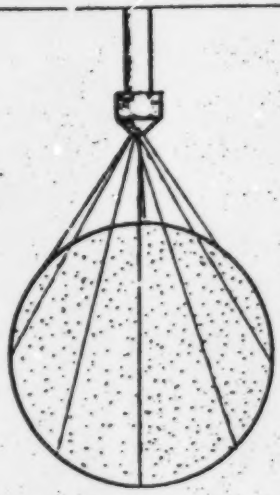


NOZZLE TIP SELECTION.

INFORMATION SHEET NUMBER 5



FLAT FAN



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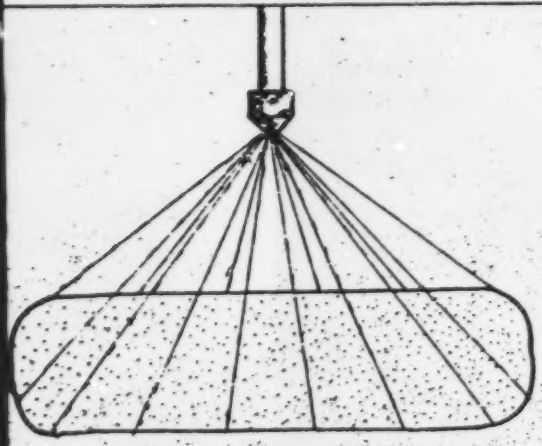
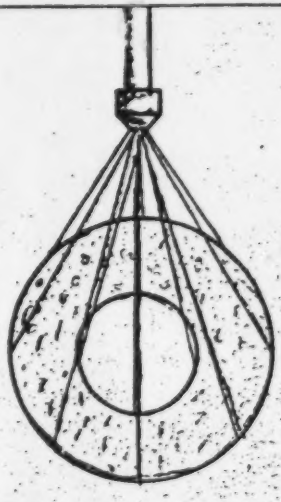


EVEN FLAT FAN



HOLLOW CONE

INFORMATION SHEET NUMBER 6

Nozzle Tip Selection

1. The nozzle converts the spray liquid in the tank to spray droplets that are applied to the soil or plant.

2. The nozzles affect:

   a. Uniformity of application
   b. Rate of application
   c. Amount of spray drift (small droplets drift more than large droplets)

3. Spray patterns for four commonly used nozzle tips are as follows:

   a. Flat fan (broadcast application)
   b. Even flat fan (band application)
   c. Solid cone (usually used for insecticides, high-volume application)
   d. Hollow cone (usually used for insecticides, low-volume application)

Inventory Sheet Number 4

1. List 4 things that affect a sprayer's calibration

   A.

   B.

   C.

   D.

2. If the pressure regulator is increased from 10 pounds to 40 pounds how much will the volume increase if it was 20 gallons per acre if all other things are equal?

3. List 3 reasons why nozzles fail to give desired pressure.

   A.

   B.

   C.

4. What problems can be created with too high pressure?

5. What happens if:

   A. Nozzles are too high from the ground?

   B. Nozzles are too low to the ground?

6. Explain the two methods of calibrating a sprayer.

7. Directions: Calculate the following problems. What are the two formulas?

   A. A sprayer uses 6 gallons in 20 rods and the spray width is 10 feet. What is the gallons per acre (show all work)?

   B. A sprayer uses 1 gallon in 10 rods with a spray width of 3 feet. What is the gallonage (show all work)?

8. Show formula for calculating tractor speed.

9. List steps to calculate speed.

10. If a tractor travels 88 feet in 25 seconds the speed is? (show all work)

11. List 8 precautions that should be taken in spraying.

Information Sheet No. 7

Conversion Factors

Liquid Measure

1 gallon = 3,785.4 milliliters = 256 tablespoons = 231 cubic inches = 128 fluid ounces = 16 cups = 8 pints = 4 quarts = .1337 cubic feet.

1 fluid ounce = 29.57 milliliters = 2 tablespoons = 6 teaspoons.

3 teaspoons = 1 tablespoon = 14.79 milliliters

1 gallon of water = 8.355 pounds = 1 cubic foot of water = 62.43 pounds = 7.48 gallons

Weight Measure

1 pound - 16 ounces = 453.59 grams
1 short ton = 2000 pounds
1 long ton = 2240 pounds
1 metric ton = 1000 kilograms = 2204.6 pounds

Linear Measure

12 inches = 1 foot
36 inches = 3 feet = 1 yard
1 rod = 16.5 feet
1 mile = 5,280 feet = 1760 yards = 160 rods = 80 chains = 1.6094 kilometers
1 chain = 66 feet = 22 yards = 4 rods = 100 links
1 inch = 2.54 centimeters = 25.4 millimeters
1 meter = 39.37 inches = 10 decimeters
1 micron (u) = 1/1000 millimeter

Area

1 township = 36 sections = 23,040 acres
1 square mile = 1 section = 640 acres
1 acre = 43.560 square feet = 160 square rods = 4840 square yards = 208.7 feet square = an area 16 1/2 feet wide and 1/2 mile long
1 hectare = 2.471 acres

Capacity

1 bushel = 4 pecks = 32 dry quarts = 35.24 liters = 1.244 cubic feet = 2150.42 cu. inches.

Formulation and Dilution Problems

A little simple arithmetic can take the head scratching out of figuring just the right amount of pesticide to use to obtain a specified mixture. Here's how:

1. If you know the weight of the commercial herbicide to use per acre, and you know the per cent of active ingredient in the commercial product, you can determine the amount of the actual herbicide (active ingredient) to apply per acre, through the use of the following formula.

$\frac{A}{B} = C$

A = weight of the active ingredient to be applied.

B = per cent of the active ingredient in the commercial herbicide or pesticide, expressed as a decimal.

C = weight of commercial material required.

EXAMPLE: Aatrex is 80% active ingredient. Suppose we know that 2 1/2 pounds of commercial material should be applied per acre, and we want to determine how much active ingredient this would be.

$\frac{A}{B} = C$

$\frac{A}{.80} = 2\ 1/2$

A = 2 1/2 .80

A = 2 lbs. of actual herbicide

2. If you know the application rate per acre in terms of active ingredient and you know the percent of active ingredient in the commercial product, you can determine the amount of commercial material to apply per acre, using the same formula as given in number 1 above.

EXAMPLE: Aatrex is 80% active ingredient. Suppose we know that 2 lbs. of actual Aatrex herbicide is to be applied per acre and we want to determine the amount of commercial material to apply per acre.

$\frac{A}{B} = C$

$\frac{2}{.80} = C$

C = 2.5# of commercial Aatrex per acre

3. If you are given the rate of application of a spray and the parts per million concentration of herbicide or pesticide in the spray, you can determine the weight of either actual or commercial herbicide to mix with the water to form that spray. You must first understand what is meant by parts per million. Parts per million means the number of parts, by weight or volume, of a constituent, in 1,000,000 parts of the final mixture, by weight or volume. For example, 1 gram of DDT in 1,000,000 grams of final spray would be 1 ppm of DDT in that spray. The author finds it most convenient to use a ratio and proportion setup to solve problems of this sort.

EXAMPLE: Suppose we want to apply 50 gallons of spray and the concentration of actual pesticide in that spray is to be 1000 ppm. Determine the pounds of actual pesticide to mix with enough water to give you 50 gallons of such a spray.

50 gallons of spray x 8.355#/gallons = 417.75

$$\frac{1000 \text{ ppm}}{1000{,}000 \text{ ppm}} = \frac{X \text{ lbs.}}{417.75 \text{ lbs.}}$$

$$1000{,}000\ X = 417750$$
$$X = .417\# \text{ of actual pesticide}$$

4. If you are given the concentration of herbicide or pesticide in a spray in parts per million, you may express this concentration in percentage, by following this line of thought. You must first of all understand per cent concentration. This is very similar to parts per million. Just remember that 10,000 ppm would equal to a 1% solution.

$$\frac{1}{100} \text{ or } .01 \text{ or } 1\%$$

EXAMPLE: Let's suppose we have a spray which has a DDT concentration of 30,000 ppm. What would be the percent of concentration of DDT?

$$\frac{\text{Concentration in ppm}}{10{,}000} = \text{per cent concentration}$$

$$\frac{30000}{10000} = \text{per cent concentration}$$

3% = per cent concentration

5. You can figure the number of pounds of commercial material to use in mixing any given quantity of spray of a given percentage toxicant, providing you are given the percent of active ingredient in the commercial material. You would use the following formula:

$$\text{lb. wettable powder to use} = \frac{\text{No. of gal. of spray} \times 8.355 \times \% \text{ toxicant desired in spray}}{\% \text{ toxicant in wettable powder}}$$

EXAMPLE: Suppose you want 500 gallons of spray containing 0.25 percent DDT. The wettable powder to be used contains 50% DDT. How many pounds of wettable powder are you going to use?

$$\text{lbs. of wettable powder to use} = \frac{500 \times 8.355 \times .25}{50}$$

$$= 21 \text{ lbs. of commercial wettable powder to use}$$

6. In dealing with liquid herbicide and pesticide formulations, you can use the formula below to determine the gallons of concentrate to be used in making up an emulsion of a given percentage of toxicant by weight.

$$\text{gallons of concentrate} = \frac{\text{No. of Gal. of spray} \times \% \text{ toxicant desired in the spray}}{\% \text{ toxicant in concentrate}}$$

EXAMPLE: How much concentrated chlordane will you need in order to obtain 2.5 gallons of spray containing 2 percent chlordane by weight. The concentrated chlordane material contains 40 percent chlordane.

$$\text{gallons of concentrate} = \frac{2.5 \times 2}{40}$$

$$= .125 \text{ gallons of concentrated chlordane}$$

7. You can use the following formula to determine the weight of pesticide material to be used in preparing a dust containing a given percentage of toxicant.

$$\text{quantity of pesticide material needed} = \frac{\% \text{ of toxicant desired} \times \text{lbs. of dust to be made}}{\% \text{ toxicant in insecticide material}}$$

EXAMPLE: How many pounds of concentrated rotenone will you need in order to prepare 100 pounds of dust containing 0.5 percent rotenone by weight? The concentrated rotenone contains 4% rotenone.

$$\text{quantity of pesticide material needed} = \frac{0.5 \times 100}{4}$$

$$= 12.5 \text{ lbs.}$$

Inventory Sheet #5

Formulation, Dilution and Application Problems

1. Let's suppose that a farmer has a sprayer which has a tank capacity of 200 gallons. He is to apply 2 lbs. of active ingredient Aatrex per acre. Aatrex is 80% active ingredient. How many pounds of commercial Aatrex will he need to put into 200 gallons of spray, assuming he is going to apply 40 gallons of spray per acre? Answer: 25#/A; 12.5#.

2. Suppose you are going to use the herbicide, Eptom, in the control of Johnsongrass in field corn and the recommendation is to use 2 lbs. of 10% active ingredient material per acre. How many pounds of actual herbicide would you apply per acre? Answer: 20 lbs.

3. The situation is as follows: You want to apply 400 gallons of diozinon spray per acre, in an orchard, and the concentration of actual pesticide in that spray is to be 600 ppm. Determine the pounds of actual pesticide to mix with enough water to give you 400 gallons of such a spray. How much commercial Diazinon, 50% of which is active ingredient, would this be? Answers: 2.005#; 4.01#.

4. What would be the percent concentration of the spray found in number 3? Answer: .06%

5. Suppose you want 400 gallons of spray containing 0.003 percent Morestin. This wettable powder is 25% active ingredient. How many pounds of wettable powder are you going to use? Answer .401#.

6. How much concentrated Vapam will you need in order to obtain 75 gallons of spray containing 3% Vapam by weight? The concentrated Vapam contains 60% Vapam. Answer: 3.75 gallons.

7. How many pounds of concentrated Chlordane would you have to have in order to prepare 50 pounds of dust containing 10% Chlordane by weight? The concentrated Chlordane contains 50% Chlordane. Answer: 10#. (extra credit)

8. Let's suppose you want to apply 3 pounds of active Aatrex material per acre. How many pounds of 80W Aatrex would you need to apply per acre? If you mixed this Aatrex in 30 gallons of water, how much Aatrex would there be in each gallon of spray? At this dilution rate, how much Aatrex would be added to a 150 gallon tank, which is completely filled? Answers: 3.75#; .125#/gal.; 18.75#. (extra credit)

9. A farmer has a corn field, the dimensions of which are 1000' by 1000'. He would like to apply Aatrex 80W at the rate of 3# of active ingredient per acre covered. He also wants to band the Aatrex over the row in 14 inch bands. How much commercial Aatrex will he need for the corn field in question and how many gallons of spray will he need if he is going to apply 30 gallons per acre covered? How much commercial herbicide will be mixed in each gallon of spray? The corn rows are 42 inches apart. Answers: 22.9 acres; 7.63 acres covered; 28.61#; 228.9 gallons; .125#/gal. (extra credit)

10. You have a sprayer that sprays a swath of 12 feet. It sprays 200 gallons of spray per hour. At the rate of 7 miles per hour, how many acres will be treated in one hours time, and how many gallons of spray will be applied per acre? Assume that the operation is 65% efficient, that is to say, that 65% of the time is used as actual spraying and 35% of the time is spent in turning, etc. Answer: 6.63 A. (extra credit)

11. You want to apply 1 pound of active ingredient 2, 4-D per acre. You purchase a product that is 40% active ingredient, and there are 4 pounds of active ingredient per gallon of this commercial 2, 4-D. How much commercial 2, 4-D, in terms of gallons, will you apply per acre? Answer: 1 qt. or .25 gallon. (extra credit)

Inventory Sheet #6

Formulation, Dilution and Application Problems

1. Farmer Jones wants to apply the herbicide, Aatrex, to his corn land. He wishes to use 3 pounds of active ingredient per acre and 20 gallons of spray per acre. How many pounds of commercial Aatrex 80W will he be applying per acre? How much commercial Aatrex will he need to mix to each gallon of spray? Express you answer in pounds.

2. Four (4) pounds of Diazinon at 20% concentrate have been mixed into enough water to form 200 gallons of spray. What is the concentration of Diazinon in this spray, expressed in parts per million? What would be the percent of concentration of Diazinon in this spray?

3. Suppose you desire to mix 100 gallons of spray containing .02 percent Morestan. The wettable powder formulation of Morestan is 25% active ingredient. How many pounds of wettable powder are you going to use?

4. How much concentrated Vapan will you need in order to obtain 100 gallons of spray containing 5% Vapan by weight? The concentrated Vapan contains 60% active Vapan.

5. A certain corn field is 800' wide and 1500' long. The corn rows are 28 inches apart. We wish to apply Aatrex in a 14 inch band over the row and we desire to apply 2 pounds of active ingredient Aatrex per acre. The amount of spray per acre will be 25 gallons. How much commercial Aatrex 80W will we need for this complete banding operation? How much Aatrex 80W, in pounds, will be added to each gallon of spray? (extra credit)

6. You have a sprayer that sprays a swath of 14 feet. It sprays 200 gallons of spray per hour. If the tractor speed is 6 miles per hour, and assuming that the spraying is 65% efficient in time utilization, how many acres will be treated in an hour's time. Also, how many gallons of spray will be applied per acre? (extra credit)

LESSONS

Lesson 5 - Herbicides - uses and recommendations

Objectives:

Through the use of current University of Wisconsin weed control information, you will be able to list and discuss six factors which need to be considered in selecting a weed control program for row crops like corn and soybeans.

In regard to weed control in corn and soybeans, you will be able to name one herbicide and provide the application recommendations for that herbicide, in each of the following six weed situations:

a. Mixed stands of annual broadleaf and grassy weeds in corn.
b. Primarily annual grasses, like the foxtails, crabgrass, and fall panicum in corn.
c. Annual and perennial broadleaf weeds only, in corn.
d. Quackgrass in corn.
e. Yellow Nutsedge (nutgrass) in corn.
f. Mixed stands of annual broadleaf and grassy weeds in soybeans.

Learning Activities:

1. Obtain University of Wisconsin bulletin SC52 entitled "Pest Control in Corn and Soybeans". Read and study pages then do Inventory sheet number 7.

2. You should also become familiar with the University of Wisconsin manual entitled "1973 Field Crops Herbicide Manual". At this time read the following sections:

   Annual Weed Control in Corn, page 1-18
   Annual Weed Control in Soybeans, page 21-32
   Quackgrass Control in Field Crops, pages 47-48
   Nutgrass Control in Field Crops, pages 48-51

3. Do Inventory Sheet Number 7.

Inventory Sheet #7

Herbicide Recommendations for Corn & Soybeans
(Review Pest Control in Corn and Soybeans)

Under each of the following weed situations, list one herbicide which is recommended for use in controlling the weeds. Also, provide the application rate and the application procedures in each case.

1. Control mixed stands of annual broadleaf and grassy weeds.

2. Control primarily annual grasses in corn.

3. Control annual and perennial broadleaf weeds only, in corn.

4. Control quackgrass in corn.

5. Control yellow nutsedge (nutgrass) in corn.

6. Control mixed stands of annual broadleaf and grassy weeds in soybeans.

Herbicide Recommendations for Close Sown Crops
(Review Pest Control in Forage and Small Crops)

Under each of the following weed situations, list one herbicide which is recommended for use in controlling weeds. Also, in each case, provide the application rate and the application procedures.

1. Controling weeds in a small grain which are undersown with a legume.

2. Controlling weeds in a small grain which is not undersown with a legume.

3. Weed control in legume seedling establishment.

4. Perennial weed control in established alfalfa.

5. Weed and brush control in established pastures.

6. Control of broadleaved weeds in lawns.

QUEST ACTIVITIES

1. Read the article "What Happens to Herbicides in the Environment?" in the Weeds Today magazine and make a 3 minute report to the class.

2. Help one student designated by the instructor to learn the different weed displays or to collect and identify his weeds.

3. Mount 10 more weeds which are designated by your instructor.

4. Bring in a sprayer and tractor and demonstrate calibrating it to the class.

Herbicide recommendations for Corn and Soybeans

Under each of the following weed situations, list one herbicide which is recommended for use in controlling the weeds. Also provide the application rate and the application procedure in each case.

1. What effects does dry weather have upon the activity of a soil applied herbicide?

2. Which of the following types of herbicides application is most effected by weather conditions - herbicides applied to the soil or herbicides applied to the plant foliage? Why?

3. Which of the following herbicide treatments provides consistantly better weed control - pre-emergence or post-emergence application? Why?

4. List four factors which will determine whether a herbicide is banded or broadcast.

5. List four simple rules which will reduce the risk of herbicide damage, if they are followed.

6. Should cultivation of row crops be used to supplement a herbicide in the control of weeds? Why?

7. What is a herbicide mixture and what are the advantages of using it?

8. Control mixed stands of annual broadleaf and grassy weeds.

9. Control primarily annual grasses in corn.

10. Control annual and perennial broadleaf weeds only in corn.

11. Control quackgrass in corn.

12. Control yellow nutsedge (nutgrass) in corn.

13. Control mixed stands of annual broadleaf and grassy weeds in soybeans.

FIND THE WEEDS

Hidden in this puzzle are the words listed below. They are forward, backward, upside down, and diagonal. However, there are misspellings of some words.

P A B C I E Y F G H I J F I E L D B I N D W E E D K L M N O P Q R S C
E Q W E R T S Y U I O P A S D F D G H J P O I S O N I V E K L Z X C O
R Z A Q W S I X E D P I G W E E D C R F V T G B Y E N A L S R U P H M
E N U J M I A K O L P Q S W E E R T Y U I O P A S D F G H J K L N O M
N A B C D E D F G H I S J W K L M N O B A R N Y A R D G R A S E I P O
N Q R S T U E V W X A Y I Z Z B X C V B N M L K J H G F M D S A A W N
I Q W E R T X Y U R I R O P A R S D F G H E L T S I H T L L U B T J R
A K Y E L L O W G O A T S B E A R D L M N W O P Q R O S L O C O N V A
L L B C D E F K G M H I G J K C L M O N I C D M B A R X K Z O R A B G
S Q T U S V C X S R S M N P B K F R H L O F U J K L S M W N A A L B W
O A B C D A E F G H I J K L M E N O D P Q C R S T U E T E A F N P G E
W X Y Z U E F A B N O P Q R T N U R A B I O R S A F T Q E G H G N R E
T Q W Q E R T Y P U I O P A S D A F G N H J K L T Z A X D C B E O B D
H N M Q D A N D E L I O N W E D R T A Y U I O P E A I B N X Z H M O A
I A B C D E F G N H I J K L I O N P O P A R S T K U L V W X Y A M Z A
S Z X C V B N M N A S D F S G H L J K W H I T E C O C K L E L W O O P
T A B C D E F G Y C H F H J K L L M N O P Q R F O X T A L L S K C T U
L B C E Z X C V C F A L L P A N I C U N B N M L R K J H G T F W D S A
E T A S B O P Q R T V N X F R S M O C J K L O P W F D E S T R E M O C
H A Q R W P E R E T Y U A I O P A S D F G H J K O R O Z X E E E T X U
O E A U B O C D S E F E G D H I J K V E L V E T L E A F L N M D N O P
A H Q P W I E R S T Y G U O A I O P A S D E F G L T H J K G L Z X C B
R W A S B S C D E F G R H D I T J K L M N O P Q E R R S T N U B W X D
Y K Y D Z O M C N B V U C D X Z H A S D F G H J Y A K L P I O I U Y R
A C A R B N C R D E F P G E H I J I K L M N O P Q U R S T G U V W X A
L V Y A Z I Z A X C V S B R M L K S S H G F D D D Q A Q N N E R T R T
Y B A H B V C B D E F Y G H I J K L M T N O P Q E S S T I I V W A D S
S D C P Q Y W G E R T F Y U I O P L K J L H G F E B D S A T Z X C V U
I L A E B C D R E F Q A H I J K L M N O P E Q R W M S T U S V W X Y M
U I U H T S M A R T W E E D R F C B Y X A C B N T A C B F C A T X Z D
M W A S B C D S E X Z L B C A F Q G H I J K L M O L N O P R S A V X L
M N A B L K G S S A R G D R A Y N R A B F R S T N M N A X Y Z O C D I
C A N A D A T H I S T L A H I J C U R L Y D O C K S S A R G H C T I W

PERENNIAL SOW THISTLE
VELVET LEAF
LAMBSQUARTER
CANADA THISTLE
COMMON RAGWEED
WITCH GRASS
BULL THISTLE
LEAFY SPURGE
WILD RADISH
HOARY ALYSSUM
ORANGE HAWKWEED
KNOTWEED
SHEPARDS PURSE
POISON IVY

PIGWEED
FOXTAIL
DODDER
BRACKEN
MILKWEED
SMARTWEED

QUACKGRASS
DANDELION
HORSETAIL
PURSLANE
CRABGRASS

YELLOW ROCKET
WILD MUSTARD
WHITE COCKLE
FALL PANICUM
BARNYARD GRASS
FIELD BINDWEED
CURLY DOCK
PENNYCRESS
YELLOW GOATSBEARD
WILD BUCKWHEAT
OXEYE DAISY
STINGING NETTLE
CONNOM PLANTAIN

BIBLIOGRAPHY

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